Western Cape Government

FOR YOU

Department of Infrastructure

Western Cape Infrastructure Strategy 2050

CONTENTS

Foreword

The vision of the Western Cape Infrastructure Framework 2050 (WCIF 2050) is to enable infrastructure-led growth and investment in the Western Cape that creates sustainable, equitable, and resilient communities. It serves as the overarching framework that establishes the long-term vision, principles, and structure for infrastructure planning and development in the Western Cape. Its core focus lies in advancing spatial transformation, promoting resilient infrastructure, and adopting an integrated approach to governance and the modernisation of the public sector.

This document – the Western Cape Infrastructure Strategy 2050 (WCIS 2050) – translates the WCIF 2050 into a comprehensive set of strategic thrusts flowing into specific governance mechanisms, stakeholder engagement strategies, infrastructure sector priorities, and monitoring systems. It bridges the high-level aspirations of the WCIF 2050 and the more immediate priorities outlined in the Western Cape Government's Provincial Strategic Plan (PSP) as it relates to the transversal focus area of Spatial Transformation, Infrastructure and Mobility. The strategies in the WCIS 2050 address thematic priorities across the social, energy and water, economic, technology, and ecological infrastructure sectors, to ensure equitable growth and sustainable development in the Western Cape.

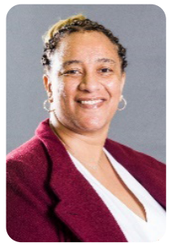
The third document – the Western Cape Infrastructure Implementation Plan 2050 (WCIIP 2050) – operationalises the WCIS 2050 by detailing actionable and phased infrastructure projects. This includes incorporating a stakeholder-driven approach, an infrastructure project pipeline and project prospectuses, tools for financing infrastructure projects, and a clear approach to managing risks. Through annual reviews, the WCIIP 2050 will ensure adaptability to emerging challenges while responding to the needs of the PSP portfolios. It responds to the PSP's focus on spatially transformed infrastructure, helping to ensure projects enhance equitable access to economic opportunities, public services, and recreational spaces for all residents of the Western Cape.

We heartily encourage all stakeholders in the public, private, community and academic sectors to engage with the high-level content of the WCIF 2050, the WCIS 2050 that gives this content strategic shape, and the WCIIP 2050 that maps out key implementation steps. The road ahead may be long and uncertain, but we have methodically worked through all the key issues with experts and a range of key stakeholders. We now have a clear sense of where we are going, what is negotiable and what is not, and how we will get there. We are committed to learning by doing, and to keep improving our work. We invite you to join us on this journey.

Our future depends on it!

Tertuis Simmers

Western Cape Provincial Minister of Infrastructure



Adv. Chantal Smith

Head: Department of Infrastructure

Executive Summary

The **Western Cape Infrastructure Strategy 2050 (WCIS 2050)** is a mission-oriented strategy, led by a transformation agenda designed to drive infrastructure-led growth, social equity and environmental sustainability across the province characterised by inclusive growth, smart growth and sustainable growth to enhance the quality of life of all citizens. Rooted in the Western Cape Infrastructure Framework 2050 (WCIF 2050), the WCIS 2050 aligns to national priorities, including the foundational principles and priorities of the Government of National Unity (GNU), the National Development Plan (NDP) and the Spatial Planning and Land Use Management Act (SPLUMA). It addresses historical spatial inequalities and socio-economic challenges while positioning infrastructure as a critical enabler of resilience, inclusivity and long-term prosperity.

The WCIS 2050 adopts an integrated delivery model that bridges high-level strategic aspirations with actionable implementation plans through the Western Cape Infrastructure Implementation Plan 2050 (WCIIP 2050). This seamless integration ensures that planning, delivery and monitoring phases are harmonised across social, economic, energy and water, technology and ecological infrastructure sectors, driving holistic and sustainable development.

Governance forms the backbone of the WCIS 2050, with the Infrastructure Ministerial Committee (IMC), Infrastructure Technical Committee (ITC) and Regional Planning Governance (RPG) Committee ensuring accountability and operational efficiency. These governance mechanisms incorporate stakeholder-driven advisory panels, fostering transparency, collaboration, and innovation in infrastructure decision-making processes. The inclusion of Communities of Practice and regional planning committees strengthens the system further, integrating perspectives from across the public and private sectors.

Stakeholder engagement and partnerships are integral to the success of the WCIS 2050. Developed through extensive consultations with provincial departments, municipalities, private entities and communities (with a focus on Women, Youth, the Elderly and Persons with Disabilities), the WCIS 2050 recognises infrastructure as an interconnected ecosystem requiring collaboration at all levels. This inclusive approach ensures that diverse interests and priorities are reflected in infrastructure planning and implementation, creating an equitable foundation for development.

The WCIS 2050 identifies five critical focus areas to guide its interventions: prioritising infrastructure projects for maximum impact, strengthening municipal capabilities, enhancing partnerships with the private sector, fostering innovation, and addressing climate change. These focus areas direct targeted efforts to advance sustainability and inclusivity.

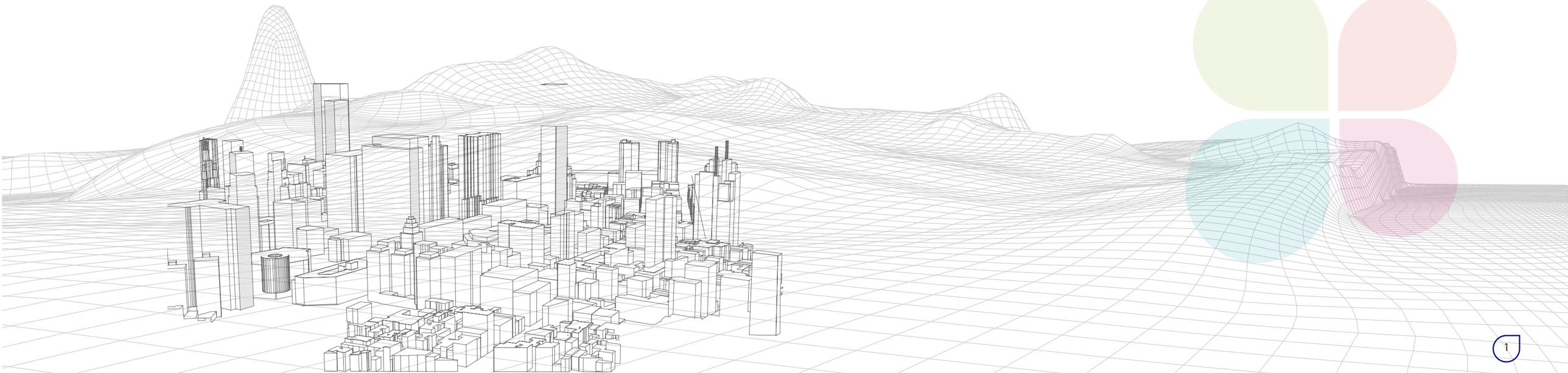
Sustainability and resilience are central to the WCIS 2050. By embedding ecological infrastructure investments and adaptive measures, the WCIS 2050 mitigates risks associated with climate change, such as extreme weather events and resource scarcity. It also leverages natural capital to enhance economic and environmental co-benefits, ensuring long-term stability and prosperity for the Western Cape.

To address funding challenges, the WCIS 2050 incorporates innovative financing models, including public-private partnerships and blended finance. These approaches aim to attract investment, ensure equitable access to services, and maximise the social and economic returns of infrastructure projects.

Monitoring and evaluation are integral to the WCIS 2050. The Logic Model and Theory of Change principles provide real-time performance tracking and facilitate adaptive management, ensuring that the WCIS 2050 remains responsive to emerging challenges and is aligned with its overarching goals.

Proactive risk management underpins the strategy, addressing vulnerabilities such as infrastructure ageing, vandalism, and cascading risks. A dedicated risk-scanning tool supports the timely identification and mitigation of risks, enhancing the resilience and safety of critical infrastructure systems.

The WCIS 2050 is more than a strategy, it is a blueprint for transformation. By integrating spatial transformation, inclusive growth, and sustainability into its design, the WCIS 2050 lays the foundation for a vibrant, equitable, and prosperous Western Cape. Its alignment with municipal, provincial and national policy directives and strategies ensures cohesive development and positions the province as a leader in innovative and sustainable infrastructure planning and delivery.



Chapter 2 Introduction

2.1 Current Socio-Economic Context

The **Western Cape Infrastructure Strategy 2050 (WCIS 2050)** is crafted against a complex and emerging socio-economic backdrop marked by global, national and provincial challenges that impact infrastructure planning and development. Globally, the moderate inflation and stable growth forecast[1] of 3.2% in 2024 and 3.3% in 2025 present a cautiously optimistic economic environment. However, the pressures of geopolitical fragmentation, commodity price spikes and ongoing supply chain disruptions cast uncertainty over long-term economic stability. Such international factors directly influence the Western Cape's economy, particularly given its reliance on imports, exports and tourism.

At the national level, South Africa's projected growth is limited, at 1% in 2024 and 1.4% in the medium term[2], highlighting structural issues like energy shortages, high unemployment and state fragility. The Infrastructure Report Card[3] (IRC 2022) states that South Africa's infrastructure is rated a concerning "D" overall, reflecting substantial declines in key areas like electricity, water, and sanitation. Eskom's ageing infrastructure, for example, continues to strain the power supply. Water infrastructure in particular, graded as D-, faces critical challenges, including a 40% loss of treated water due to leaks and illegal connections. The South African Institute of Civil Engineering (SAICE) report[4] further emphasises a national trend of underfunded and reactive infrastructure maintenance, placing increased pressure on provincial systems to bear the brunt of both service delivery and climate resilience deficiencies.

In the Western Cape, forecasted growth rates of 1.3% in 2024 and 1.8% in 2025 are overshadowed by high youth unemployment and the rapid growth of urban and peri-urban populations, increasing strain on existing infrastructure[4]. These challenges are exacerbated by energy supply disruptions, which impede the functionality of critical systems such as water treatment and transport networks. The Western Cape's ageing infrastructure also faces risks from crime, most notably the construction mafia, and vandalism, which has increasingly targeted essential components, creating safety hazards and economic setbacks.

In response, the WCIS 2050 prioritises resilient, sustainable infrastructure projects that address these risks across all economic levels. The WCIS 2050 focuses on securing critical energy and water resources, generating employment opportunities, especially for youth, and fostering collaboration between public and private sectors.

Through a focus on sustainable asset management, the WCIS 2050 leverages both preventative and predictive maintenance to mitigate the occupational health risks and costs associated with reactive maintenance, striving to increase the infrastructure's lifespan and efficiency. At the same time infrastructure renewal is seen as a proactive strategy for transformation, rather than just a reaction to degradation. There needs to be a strong emphasis on how infrastructure replacement can advance equity, sustainability and innovation, beyond just maintaining service levels. By embedding adaptive, climate-resilient measures into long-term planning, the WCIS 2050 aims to foster an infrastructure ecosystem capable of withstanding future challenges and promoting economic growth while enhancing quality of life for all Western Cape residents.

2.2 Policy Alignment of the WCIS 2050

2.2.1 International and Regional alignment

The **Sustainable Development Goals (SDGs)** are the blueprint to achieve a better and more sustainable future for all. Goal 9 seeks to build resilient infrastructure, promote sustainable industrialisation and foster innovation. Economic growth, social development and climate action are heavily dependent on investments in infrastructure, sustainable sector development and technological progress.

Agenda 2063, implemented by the New Partnership for Africa's Development (NEPAD), is Africa's blueprint and master plan for transforming Africa into the global powerhouse of the future. It is the continent's strategic framework that aims to deliver on its goal for inclusive and sustainable development. Its goals include a high standard of living, quality of life and wellbeing for all citizens, transformed economies, environmentally sustainable and climate resilient economies and communities, and world class infrastructure.

2.2.2 National alignment

The **WCIS 2050** is designed to align comprehensively with South Africa's national strategies and legislative frameworks, positioning the Western Cape as a model of sustainable, inclusive infrastructure development that drives social and economic transformation. It is aligned to the GNU's foundational principles, which include social justice, redress and equity, and the alleviation of poverty; human dignity and the progressive realisation of socio economic rights; and evidence-based policy and decision-making. It is also aligned to the GNU's key priorities and is especially focused on Priority 1, which is "Rapid, inclusive and sustainable economic growth, the promotion of fixed capital investment and industrialisation, job creation, transformation, livelihood support, land reform, infrastructure development, structural reforms and transformational change, fiscal sustainability, and the sustainable use of our national resources and endowments".

Rooted in the ***National Development Plan (NDP),*** the WCIS 2050 emphasises sustainable growth and infrastructure-led economic transformation, directly supporting South Africa's vision for poverty reduction, equality and increased employment through strategically driven development that does not compromise environmental integrity.

The WCIS 2050 is aligned to the ***National Infrastructure Plan (NIP) 2050***, which places emphasis on the importance of resilient infrastructure that can adapt to future economic, social, and environmental needs. By fostering public-private collaborations, the WCIS 2050 promotes a 'share-risk/share reward' symbiotic relationship making it mutually beneficial to all parties in the context of the 6-capitals framework leveraging each other's resources in a meaningful way in the pursuit of the mission's outcomes. It also promotes infrastructure that not only meets present-day requirements but also anticipates long-term demands for sustainability and resilience in all sectors. This strategic alignment allows the Western Cape to optimise funding sources and accelerate infrastructure delivery through innovative partnerships with the private sector.

Furthermore, the WCIS 2050 integrates the ***Spatial Planning and Land Use Management Act (SPLUMA)*** principles, which prioritises spatial justice, spatial resilience, spatial sustainability and spatial efficiency. By embedding SPLUMA's development principles into its strategy, the WCIS 2050 ensures that infrastructure investments actively support spatial transformation across the Western Cape, addressing the historical legacies of spatial inequality. SPLUMA's guidelines for coordinated land use and equitable infrastructure investments are key to the WCIS 2050's approach, which prioritises projects in high-need areas and fosters more inclusive, well-connected urban and rural environments. This alignment reinforces a commitment to structured, transparent planning processes that promote equitable access to infrastructure services, underscoring the Western Cape's role as a leader in implementing transformational infrastructure that contributes to sustainable growth and social equity.

2.2.3 Provincial alignment

Provincial Strategic Plan (PSP) 2025-2030

The **Provincial Strategic Plan (PSP)** sets out the integrated strategic goals and priorities of the Western Cape Government (WCG) for the next five years (2025-2030). **Spatial Transformation, Infrastructure and Mobility** is the first transversal focus area across the following four portfolios in the PSP: **Growth for Jobs, Safety, Wellbeing & Dignity, and Innovation, Culture, & Governance**. The second transversal focus area across the four portfolios is **Resource Resilience**. Central to these is the shared commitment to a "people-centred impact," enabling economic opportunities and enhancing the quality of life for all Western Cape residents.

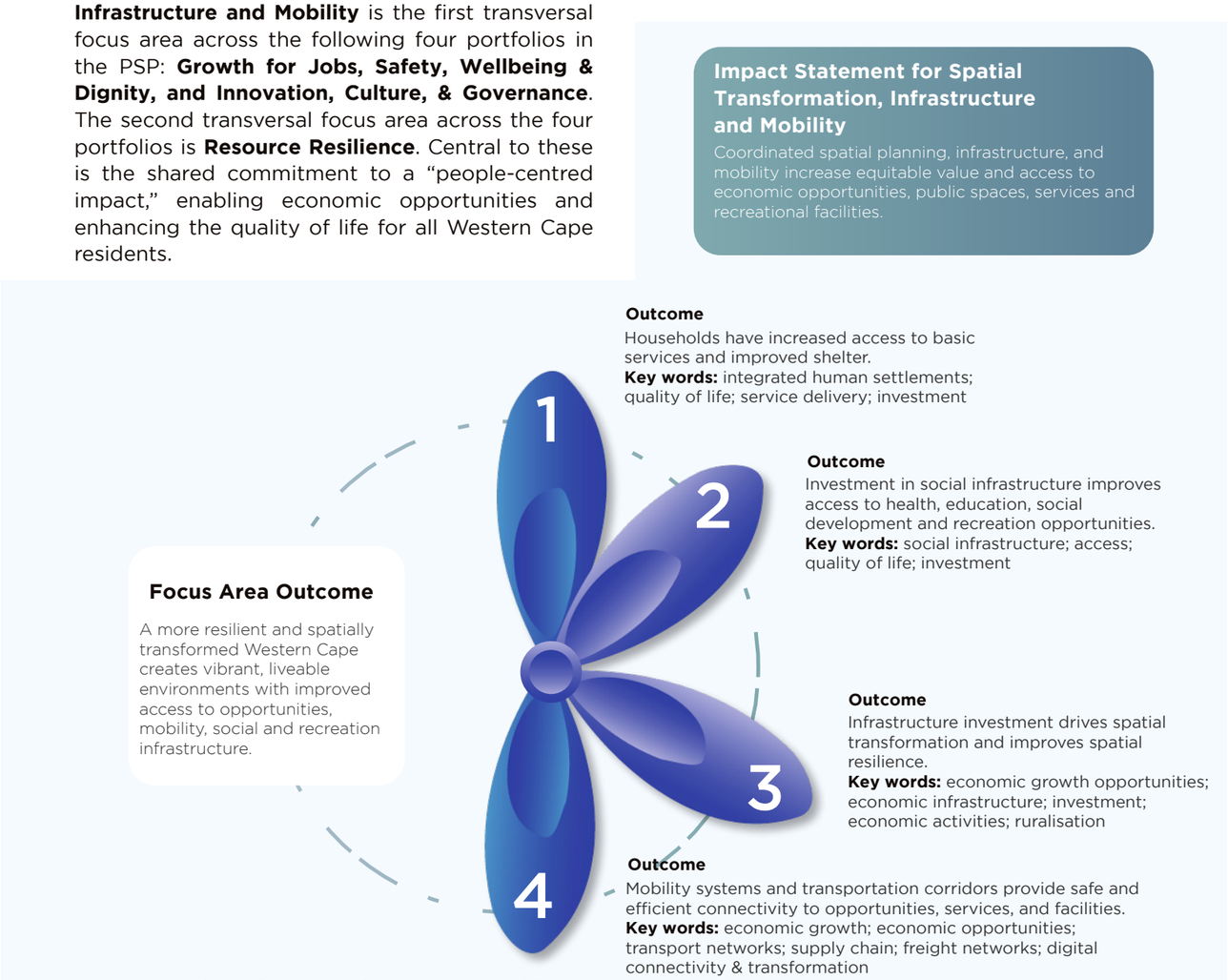


Figure 1: Spatial Transformation, Infrastructure and Mobility as the transversal focus area of the PSP 2025-2030

Growth for Jobs (G4J) Strategy

The WCIF 2050 closely aligns with the G4J Strategy's goals of economic inclusion and job creation through infrastructure-led growth. The G4J's Priority Focus Area (PFA) 6 is Infrastructure and the Connected Economy. The Goal statement for PFA 6 is "The Western Cape economy will have the infrastructure required to support and enable a R1 trillion economy by 2035 and public sector capital investment in the Western Cape will be 10% of regional GDP". The Objective statement for PFA 6 is: "To coordinate, prioritise, plan and implement the timeous delivery of relevant and smart infrastructural solutions (physical, digital and hybrid) to support break-out economic growth and a connected economy, providing flexible, resilient infrastructure that intelligently connects spaces, places, and people, transforms lives and delivers sustainable value to the economy and ecology of the Western Cape".

Recognising the interconnected economy, the WCIF 2050 emphasises developing infrastructure that directly supports the workforce by focusing on labour-intensive projects and advancing local enterprise growth. By creating an infrastructure project pipeline that aligns with economic development, job growth and skill development, the WCIS 2050 and WCIIP 2050 will catalyse employment opportunities across sectors and geographical areas, reinforcing the provincial commitment to inclusive economic growth.

Western Cape Ecological Investment Infrastructure Framework (EIIF)

The EIIF, integrated into the WCIF 2050, promotes the resilience of the Western Cape's natural assets by encouraging ecological infrastructure investments that enhance sustainability and mitigate environmental threats. The WCIS 2050 and WCIIP 2050 are committed to preserving water security, managing invasive species, and reducing the risks associated with natural disasters, such as fires and floods. By embedding ecological priorities in infrastructure planning, the WCIS 2050 strengthens both natural resource protection and economic resilience, ensuring long-term sustainability in the Western Cape.

Western Cape Spatial Development Plan (WCSDP)

The WCIF 2050 aligns with the Western Cape Spatial Development Plan by addressing the spatial inequalities created by historical legacies and prioritising infrastructure that promotes equitable spatial transformation. By planning infrastructure in a way that improves access to economic centres and essential services, the WCIS 2050 and WCIIP 2050 seek to create balanced growth across urban and rural areas. This approach directly supports social cohesion and equitable economic opportunities, fostering a more inclusive future across the Western Cape.

Western Cape Climate Change Response Strategy

The Western Cape Climate Change Response Strategy aims to make the Western Cape province a climate-resilient and net-zero emission region by 2050, focusing on transitioning to a low-carbon economy while adapting to the impacts of climate change through collaboration between public, private, and civil society sectors. It incorporates the latest climate science and aims for an equitable and inclusive approach to climate action. Its focus areas are responding to the climate emergency, transitioning to net-zero emissions, reducing climate risks, and building resilience.

Western Cape Provincial Land Transport Framework (PLTF)

The Provincial Land Transport Framework (PLTF) is a provincial requirement flowing from the National Land Transport Act (Act No. 5 of 2009) (NLTA), which states in Sections 11(1)(b)(i) and (ii) that the WCG is responsible for "Formulation of provincial transport policy and strategy, within the framework of national policy and strategy, … planning, coordination and facilitation of land transport functions in the province, and preparing the Provincial Land Transport Framework".

The PLTF provides for a high-level strategic framework that guides for all modes and levels of land transport planning in the Western Cape, and is designed to achieve the following:

- Align transport planning with all relevant national and provincial goals and strategies.
- Integrate transport planning across modes, i.e., road, rail, pipelines and non-motorised transport (NMT), as well as air and sea transport, to the extent that they interface with land transport.
- Coordinate transversal transport planning across all sectors, i.e., public, private and freight transport, as well as the various service provider categories, such as bus operators, commuter rail and minibus taxis.
- Integrate planning across the three tiers of State entities responsible for transport and related agencies, e.g., the National Department of Transport (NDoT), Transnet, the Passenger Rail Agency South Africa (PRASA), Metrorail, the WCG's Mobility and Infrastructure Departments (WCMD and WCDOI) and all local government planning authorities (metros, district and local municipalities).

2.2.4 Municipal alignment

Integrated Development Plans (IDPs)

Integrated Development Plans (IDPs) are a cornerstone of municipal governance in South Africa, serving as a five-year strategic plan that guides development and service delivery at the local level. It provides a structured approach to addressing the needs of communities while ensuring that municipal resources are used efficiently and effectively. The significance of the IDP Framework lies in its ability to coordinate planning and resource allocation. By integrating various development initiatives and fostering collaboration among stakeholders, the framework ensures that municipal efforts are directed toward sustainable and inclusive growth.

Municipal Spatial Development Frameworks (MSDFs)

Municipal Spatial Development Frameworks (MSDFs) are strategic planning tools that guide spatial development and land-use management within a municipality. They form a critical component of the IDPs and align with broader regional, provincial and national development strategies.

Municipal Finance Management Act (MFMA)

The Municipal Finance Management Act (MFMA) of 2003 is a South African law that aims to improve financial management in local government. The MFMA's goal is to ensure that municipalities can deliver services sustainably.

Capital Expenditure Framework (CEF)

The Capital Expenditure Framework (CEF) is a key legislated municipal infrastructure planning and financing tool. It is a structured plan used by municipalities to outline its long-term investment priorities for infrastructure projects. It integrates with a municipality's IDP and MSDF to ensure capital investments align with broader socio-economic development goals.

2.3 An integrated model for delivery

The **PSP's** portfolios, namely Growth for Jobs, Safety, Wellbeing & Dignity, and Innovation, Culture and Governance, are directly supported by the strategic and operational focus areas of the WCIF 2050, WCIS 2050, and WCIIP 2050, which together ensure a cohesive infrastructure-led growth and development approach that in turn benefits the communities of the Western Cape. At its core, the PSP adopts **Spatial Transformation, Infrastructure, and Mobility** as a transversal theme, ensuring the integration of physical and social infrastructure to create a "people-centred impact" that improves the quality of life for Western Cape residents. The PSP's impact statement underscores the importance of coordinated spatial planning and infrastructure development to increase equitable value and access to economic opportunities, public services, and recreational facilities for all citizens.

The **WCIF 2050** serves as the overarching framework that establishes the long-term vision, principles, and structure for infrastructure planning and development in the Western Cape. Its core focus lies in advancing spatial transformation, promoting resilient infrastructure, and adopting an integrated approach to governance and public sector modernisation. The WCIF 2050 draws its influence from both international strategic principles, such as those of the UN, World Bank, and OECD, as well as national shaping priorities, including the National Development Plan (NDP), National Infrastructure Plan (NIP 2050), and the Spatial Planning and Land Use Management Act (SPLUMA). Its impact statement emphasises the creation of a flexible, innovative and inclusive infrastructure framework that aligns the diverse needs of people, businesses and the natural environment.

Building on this, the **WCIS 2050** translates the WCIF 2050's vision into a comprehensive set of strategic thrusts flowing into specific governance mechanisms (Chapter 4), stakeholder engagement and partnership (Chapter 5), infrastructure sector priorities (Chapter 7) and monitoring systems (Chapter 9). It bridges the high-level aspirations of the WCIF 2050 with the more immediate priorities outlined in the Provincial Strategic Plan (PSP) as it relates to the transversal focus area of Spatial Transformation, Infrastructure and Mobility. The WCIS 2050 ensures that its strategies address thematic priorities across Social, Economic, Energy and Water, Technology and Ecological infrastructure sectors, ensuring equitable growth and sustainable development in the Western Cape.

The **WCIIP 2050** then operationalises the WCIS 2050 by detailing actionable and phased infrastructure projects, with an initial primary focus on the short-term (up to 2030). This includes incorporating a stakeholder-driven approach (Chapter 4), infrastructure project pipeline (Chapter 5), financing infrastructure projects (Chapter 6) and risk management (Chapter 8). Through annual reviews, the WCIIP 2050 ensures adaptability to emerging challenges while responding to the needs of the PSP portfolios. It responds to the PSP's focus on spatially transformed infrastructure by ensuring that projects enhance equitable access to economic opportunities, public services, and recreational spaces for all residents.

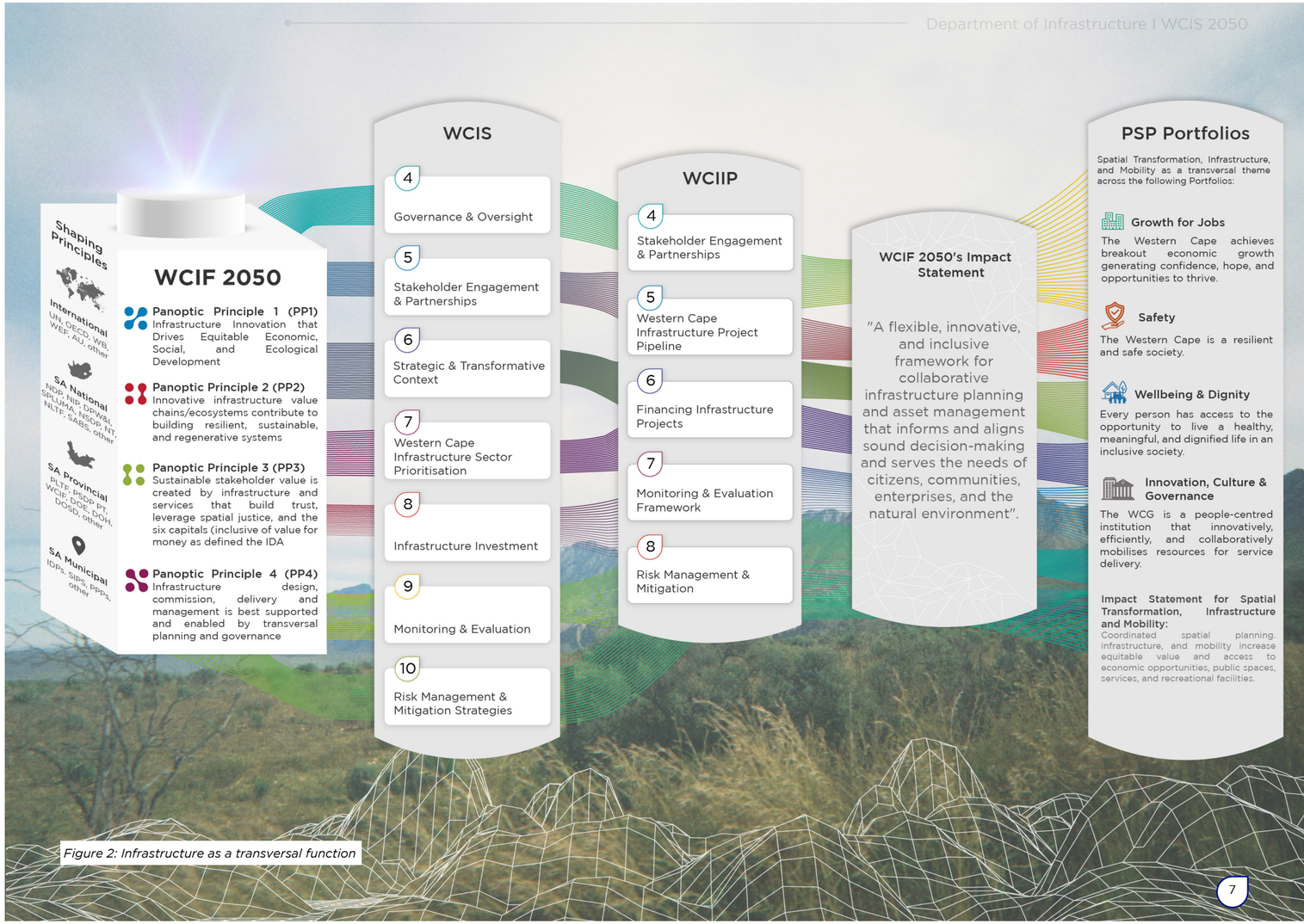


Figure 2: Infrastructure as a transversal function

2.4 The WCIF 2050, WCIS 2050 and WCIIP 2050

The WCIF 2050 sets the broad vision, the WCIS 2050 defines specific strategic priorities, and the WCIIP 2050 translates these into actionable projects. Table 1 demonstrates how the infrastructure user communities may obtain the required integrative, transversal and networked value of methods, tools and practices. This view reflects the consistency and integrative direction that the WCG is encouraging into the future.

WCIF 2050 Framework	**WCIS 2050** Strategy	**WCIIP 2050** Implementation
Purpose The WCIF 2050 is designed to guide the life-cycle management of infrastructure in the Western Cape, by synthesising policy and legislative directives as well as citizen-centric and eco-centric priorities.	**Purpose** The WCIS 2050 serves as a comprehensive strategic navigation model, as directed by the foundational principles of the WCIF 2050. It provides key strategic thrusts advancing the PSP priorities, while contextualising the actions detailed in the WCIIP 2050.	**Purpose** The WCIIP 2050 directs implementation as directed by the sector priorities identified in the WCIS 2050.
Guidelines The WCIF 2050 is grounded in clear science and data. It integrates global, regional, national, provincial and local policies into a unified set of Panoptic Principles (universal). These Principles flow from the Framework into the Strategy and then into Implementation, thereby offering consistent integrative practice value to all stakeholders.	**Guidelines** ▸ Harmonisation (policy & prescript ideals). ▸ Integration (of critical design from planning to asset disposal). ▸ Strategic Planning (phasing of priorities and projects across time horizons). ▸ Navigation (M&E) (measuring the implementation of the WCIF 2050). ▸ Risk (the focus of high-level strategic and integrative risks (e.g. Cascading & Integrative risks).	**Guidelines** ▸ Embeds critical policy design. ▸ Project pipeline prioritisation model to improve project design, planning and implementation. ▸ Enabling integrative tools, utilising planning frameworks from the NT and DPME, which is mapped to the logic model framework. The WCIIP 2050 platform is designed to serve the public sector as a trusted repository, facilitating seamless communication and data sharing to foster the development of Communities of Practice.
Tools & Aids The WCIF 2050 draws on research grounded in open systems science, integrating scientific methods with practical applications and innovative tools to foster empathetic collaboration. This approach bridges theory and practice, enabling dynamic and inclusive solutions to complex challenges.	**Tools & Aids** ▸ The WCIS 2050 provides strategic thrusts designed to guide focused and impactful delivery. ▸ The WCIS 2050 identifies sector priorities to align and direct stakeholder efforts effectively. ▸ The WCIS 2050 introduces a strategic navigation model to foster innovative and transformative practices.	**Tools & Aids** ▸ The WCIIP 2050 offers user-friendly templates that simplify adoption, editing, updating, and online submissions, thereby supporting self-regulation and efficient workflows. ▸ The WCIF 2050, WCIS 2050, and WCIIP 2050 artefacts leverage platform technologies to provide ubiquitous access, enhancing both “ease of business” and “ease of government” for all stakeholders.

Table 1: WCIF 2050, WCIS 2050 and WCIIP 2050 – moving from the Framework to Strategy to Implementation

The **WCIF 2050** emphasises a comprehensive, systems-based approach to infrastructure development. It is a living framework that is dynamic and evolving, remaining adaptable to changing circumstances over time. The WCIF 2050 is designed to be regularly updated, reviewed and refined in response to emerging challenges, new data, policy shifts, technological advancements and societal needs.

The **WCIS 2050** is a critical evolution in the journey to realise the vision and overarching strategic objectives set out in the WCIF 2050, serving as the strategic blueprint to guide infrastructure growth and development in the Western Cape over the next three decades. As the next step, the WCIS 2050 transforms the broad, aspirational framework of the WCIF 2050 into a targeted strategy that defines clear sector priorities and milestones across the short, medium, and long term. This will ensure that infrastructure investment is aligned with the Western Cape’s long-term goals of sustainability, equity, and resilience, and also responsive to immediate and emerging challenges.

The **WCIIP 2050** serves as the operational roadmap for translating the strategic priorities of the WCIS 2050 into tangible, actionable projects across Social, Energy and Water, Economic, Technology and Ecological sectors. It bridges the gap between immediate action and long-term vision, ensuring that each project contributes to the overarching goals of sustainability, equity, and resilience outlined in the WCIF 2050. Designed as a phased approach, the WCIIP 2050 will prioritise the first five years of implementation while allowing for annual reviews to ensure adaptability and responsiveness to emerging challenges and opportunities.

The **WCIF 2050, WCIS 2050 and WCIIP 2050** have been expressly designed to facilitate integration of vital policy directives and operational compliance factors (see Figure 3). It is a critical systems-oriented design that adopts a comprehensive, multi-layered structure and a set of tools that provide unique value for infrastructure growth and development in the Western Cape.

Figure 3: WCIF 2050, WCIS 2050 and WCIIP 2050 Alignment

As illustrated in Figure 3, alignment takes places at the following four levels:

- At the **Policy level**, it supports core internal initiatives (e.g. SDG17) and is deeply anchored in both international mandates and South Africa's national frameworks, such as the NDP 2030, prioritising redress and equitable access at the national policy level.
- At the **Strategic level**, the focus is on inclusive, smart, net zero carbon, and sustainable growth through innovative frameworks, including the Mission-Oriented Innovation Model and the King IV guidelines, which foster integrated decision-making processes.
- At the **Tactical level**, it aligns environmental, social, and governance (ESG) priorities with responsible resource utilisation and the creation of shared value, ensuring a balanced approach to development.
- At the **Operational level**, it focuses on the practical implementation of strategies, with an emphasis on project management, service delivery, disaster management and disaster risk reduction, and continuous improvement, ensuring the efficient execution of initiatives.

Underpinning these levels are critical capitals of value creation, namely financial, manufactured, human, social and relationship, and intellectual and natural capitals, which ensure that the WCIF 2050, WCIS 2050 and WCIIP 2050 integrate inclusivity, intelligence and sustainability. This integrated approach promotes systemic, transformative change that advances socio-economic growth and development while addressing inequality and fostering long-term resilience.

Chapter 3

WCIF 2050 and WCIS 2050

3.1 Synopsis of the WCIF 2050

3.1.1 Executive Summary

The **Western Cape Infrastructure Framework 2050 (WCIF 2050)** provides a transformative vision as it adopts a Critical-Futures orientation[1,2] for infrastructure growth and development, focusing on building a sustainable, inclusive and resilient Western Cape. It recognises infrastructure as a driver of social equity, economic growth and environmental stewardship while addressing the region's unique spatial and socio-economic challenges. Central to the WCIF 2050 is integrated planning that aligns land use, spatial realities, and equitable development across urban and rural areas, emphasising collaboration among government levels, private sector partners and communities (with a focus on Women, Youth, the Elderly and Persons with Disabilities). The WCIF 2050 adopts an outcomes-based approach to ensure that infrastructure investments creates, delivers and captures tangible stakeholder value, addressing long-standing spatial inequalities, improving quality of life, and fostering social and economic inclusivity.

Aligned with the priorities of the Government of National Unity (GNU), the WCIF 2050 supports the GNU's priorities, including inclusive growth and job creation; to reduce poverty and tackle the high cost of living; and to build a capable, ethical and developmental state. At the provincial level, it complements the Western Cape Government's (WCG) goals of driving infrastructure-led economic growth, ensuring energy and water security, enhancing education and healthcare, and promoting safety through devolved law enforcement. The WCIF 2050 integrates the Ministerial priorities of accelerating infrastructure delivery, embracing innovative construction methods, fostering private sector partnerships, unlocking new funding sources, and developing skills pipelines to sustain infrastructure development. These priorities acknowledge that traditional approaches are insufficient to meet growing demands, necessitating innovative models and cutting-edge technologies to address infrastructure challenges.

The WCIF 2050 recognises infrastructure as a Complex Adaptive System (CAS), highlighting its interconnectedness with societal, economic, and environmental factors. By fostering continuous stakeholder engagement and feedback, it ensures adaptability and continuous iterative improvements. Guided by Panarchic Governance and Panoptic Principles, the WCIF 2050 promotes inclusive, transparent and adaptive decision-making to advance climate resilience, spatial justice and ecological sustainability.

Aligned with national and provincial policies, including the NDP, the NIP 2050 and the WCSDF 2035, the WCIF 2050 integrates infrastructure strategies to address spatial and economic inequities while unlocking funding from national and private sources to transform the regional economy. Its mission-oriented approach[3,4] positions the public sector as a leader in tackling societal challenges like climate change, economic growth and social inclusion.

The WCIF 2050 emphasises regenerative infrastructure, restoring environmental and social capital while driving long-term ecological and societal wellbeing. By integrating digital tools and prioritising sustainable funding through private partnerships and corporate investments, the WCIF 2050 ensures modernised public services, efficient governance and infrastructure that supports a prosperous and sustainable future.

The WCIF 2050 represents a holistic, forward-thinking framework that integrates governance, innovation, collaboration, and sustainability. By aligning with national and provincial priorities, fostering private sector engagement, and embracing innovative approaches, it sets the stage for infrastructure to serve as a catalyst for economic prosperity, social equity, and environmental resilience in the Western Cape. This Framework ensures infrastructure development is future proof, addressing the inequities of the past while accelerating the transition to a prosperous and sustainable future.

3.1.2 Vision

The WCIF 2050 will enable infrastructure-led growth and investment for the Western Cape that will benefit the communities we serve.

3.1.3 Impact Statement

A flexible, innovative and inclusive framework for collaborative infrastructure planning and asset management, that informs and aligns sound decision-making and serves the needs of citizens, communities, enterprises and the natural environment.

3.1.4 The WCIF 2050's overarching objectives guiding the WCIS 2050

1. **Stimulate Economic Growth and Job Creation**: Foster economic development by driving infrastructure-led growth and expanding employment opportunities.
2. **Maximise Infrastructure Benefits**: Ensure infrastructure projects generate significant economic and social returns for all citizens of the Western Cape.
3. **Enhance Informal Infrastructure**: Upgrade and formalise informal infrastructure while preserving community functionality and value.
4. **Deliver Coordinated and Efficient Services**: Provide well-coordinated, effective and efficient infrastructure and services that enhance quality of life across the region.
5. **Attract Private Sector Investment**: Leverage private sector participation in infrastructure development, ensuring broad-based cost-benefit alignment for inclusive growth.
6. **Drive Innovation and Integrated Planning**: Emphasise innovation, long-term planning, and an integrated approach to ensure infrastructure development meets future demands.
7. **Promote Climate-Resilient and Transformative Infrastructure**: Design and implement infrastructure projects that address climate change, ensuring long-term resilience and sustainability.
8. **Align with Existing Plans**: Ensure all infrastructure initiatives are aligned with both public and private sector strategies and frameworks for cohesive development.

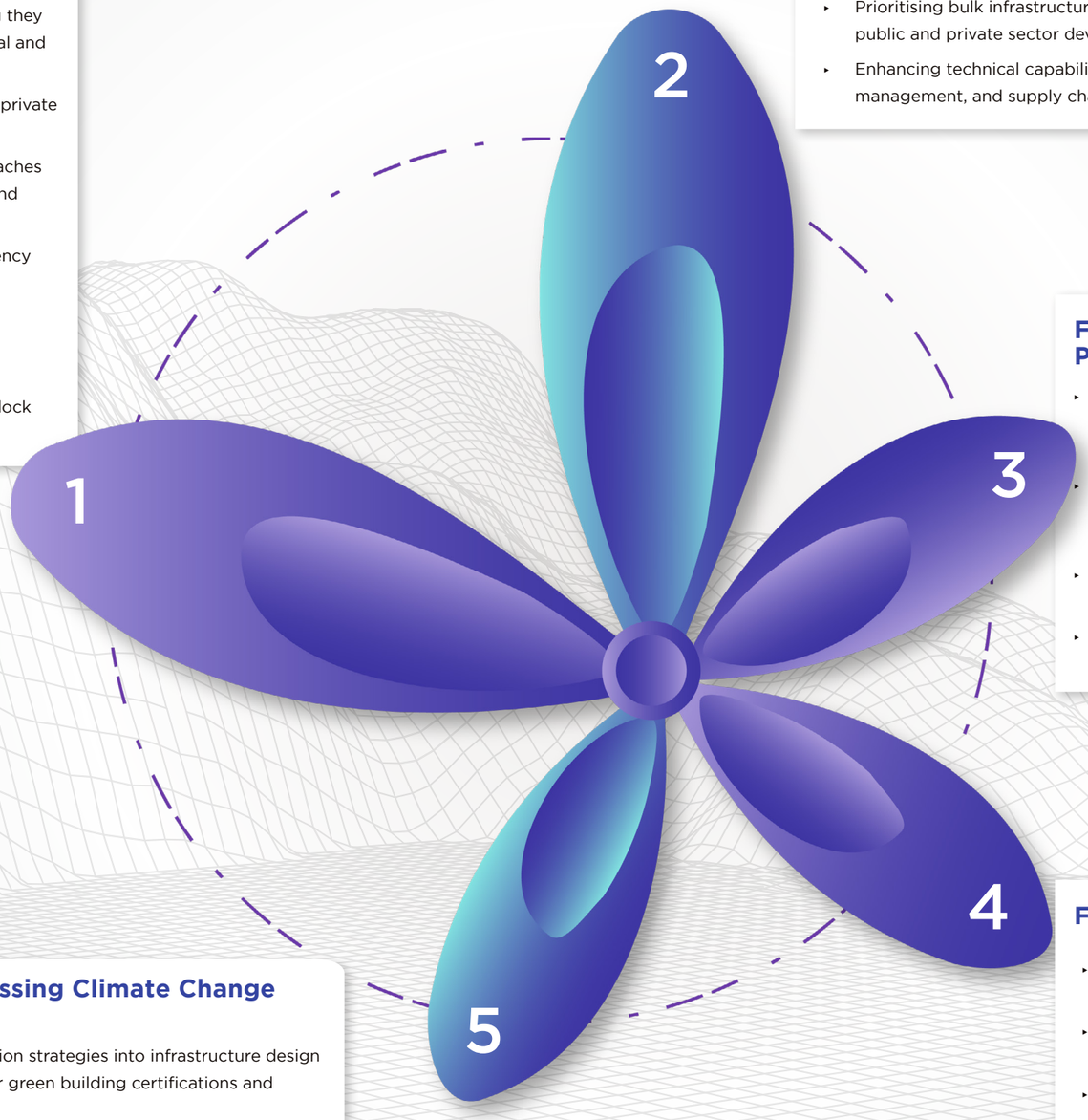
3.1.5 WCIF 2050's Focus Areas

Focus Area 1: Prioritising Infrastructure for Maximum Impact

- Coordinating existing planning processes to align with the WCIF 2050's Vision.
- Identifying major interventions and catalytic projects, ensuring they drive economic growth and job creation while addressing social and environmental needs.
- Mobilising new investments by engaging with both public and private sectors to secure necessary funding and partnerships.
- Innovating delivery models across sectors, piloting new approaches to ensure the infrastructure remains resilient, transformative, and adaptable.
- Standardising infrastructure components to ensure cost-efficiency and compliance with provincial and national norms.
- Enhancing spatial transformation through the development of inclusive, multi-opportunity settlements, integrating social and ecological priorities.
- Leveraging partnerships with Infrastructure South Africa to unlock significant projects.

Focus Area 2: Strengthening Municipal Infrastructure

- Understanding the local infrastructure baseline through collaborative assessments with local government and government entities to prioritise interventions.
- Developing sustainable financial models to address revenue challenges, ensuring long-term viability for infrastructure maintenance and operations.
- Prioritising bulk infrastructure provisioning, which is essential for the success of both public and private sector developments.
- Enhancing technical capabilities by supporting municipalities with engineering, project management, and supply chain improvements.



Focus Area 3: Enhancing Private Sector Partnerships

- Innovating procurement models to encourage co-investment, strategic sourcing, and long-term contracting that balances risks and rewards for both government and the private sector.
- Exploring private-sector-driven infrastructure models where appropriate, ensuring they align with provincial norms and deliver on infrastructure objectives efficiently.
- Navigating legislative landscapes to ensure compliance while fostering innovation in procurement and financial management.
- Adopting modular construction to mitigate risks, streamline processes, and reduce costs.

Focus Area 4: Innovation and Futures Planning

- Positioning R&D and Innovation as a strategic requirement in infrastructure planning and development.
- Driving innovation, research, and development in infrastructure design and delivery, with a focus on alternative materials and construction techniques.
- Building in-house construction capabilities to enhance cost efficiency and rapid response, especially in provincial roads and public works.
- Strengthening futures thinking and complexity science capabilities within the Department of Infrastructure to anticipate long-term needs and integrate foresight into planning processes.
- Creating an R&D ecosystem that fosters public-private collaboration, leveraging partnerships with academic and research institutions.
- Design innovative service delivery business models of the future for the future.

Focus Area 5: Addressing Climate Change and Sustainability

- Incorporating carbon reduction strategies into infrastructure design and construction, striving for green building certifications and energy efficiency.
- Enhancing resilience through climate-adaptive infrastructure that withstands extreme weather events and other climate impacts.
- Unlocking green economy funding to support sustainable infrastructure development in line with international climate obligations, such as COP26.

Figure 1: WCIF 2050's Focus Areas

3.1.6 WCIF 2050's Chapter highlights and key points of emphasis

The **WCIF 2050** integrates governance, a mission-oriented approach, Panoptic Principles and ecological infrastructure to address complex societal challenges, while advancing sustainable development across the Western Cape. Each chapter reflects how these frameworks contribute to a resilient, equitable, and future-focused infrastructure strategy.

Chapter 1: King IV[5] Integrated Decision-Making Model

The WCIF 2050 aligns with **King IV[5] governance principles**, emphasising ethical culture, good performance, effective control and legitimacy. Infrastructure decisions are guided by these principles to ensure cohesive alignment across financial, manufactured, human, social, intellectual and natural capitals. A responsible governance environment is central to this approach, incorporating the **Triple Bottom Line**, economic, societal, and environmental impacts, into decision-making. For the WCIF 2050, this means infrastructure projects must deliver sustainable social and economic outcomes while preserving natural resources for future generations.

Chapter 3: Mission-Oriented Approach[3,4]

The WCIF 2050 adopts a **mission-oriented approach** that positions the public sector as the driver of cross-sectoral efforts to tackle complex societal challenges through innovation and systemic change. This approach moves beyond addressing immediate infrastructure needs, aiming to foster long-term public value by integrating solutions across sectors and creating transformative outcomes that benefit society as a whole. Focused on addressing key challenges such as climate change, economic sustainability, and social inclusion, the mission-oriented approach ensures that infrastructure planning contributes to systemic resilience and equity. For example, aligning with SDG 13 (Climate Action), the WCIF 2050 envisions developing carbon-neutral cities and towns by 2050 through initiatives such as adopting sustainable construction methods, promoting renewable energy, and resource efficiency and water sensitive design.

Similarly, aligning with SDG 9 (Industry, Innovation and Infrastructure), the WCIF 2050 emphasises digital transformation by fostering smart cities and towns that modernise public infrastructure, enhance governance, and stimulate economic growth through innovations like 5G networks, AI-driven systems, and real-time data integration. This mission-oriented approach integrates infrastructure into broader societal goals, ensuring that projects deliver not only functional solutions but also systemic improvements that align with the WCG's vision for a sustainable, inclusive future. Importantly, a mission needs to be defined within the parameters of the SMART framework, namely it must be Specific, Measurable, Achievable, Relevant and Timebound, in keeping with the governance of accountability and M&E.

Chapter 5: Panoptic Principles

The WCIF 2050 embeds **Panoptic Principles** to ensure governance is adaptive, transparent and inclusive, enabling stakeholders to collaborate across sectors and levels of government. The identified Panoptic Principles guide infrastructure planning to address spatial, social, and environmental challenges while fostering long-term resilience:

1. **Infrastructure Innovation**: Drives equitable economic, social, and ecological development.
2. **Value Chain Innovation**: Builds resilience through regenerative systems.
3. **Stakeholder Value Chains**: Promotes trust, spatial justice, and the integration of the six capitals from the Infrastructure Development Act.
4. **Transversal Governance Tools**: Supports the design, commissioning, delivery, and management of infrastructure.

Chapter 6: Complex Adaptive Systems[6-8]

The **WCIF 2050** frames infrastructure systems as **Complex Adaptive Systems (CAS)**, emphasising their interconnectedness with societal, economic and environmental factors. This perspective recognises that infrastructure does not operate in isolation, but is part of a dynamic ecosystem where iterative adaptation is essential for resilience and sustainability. The CAS approach integrates **systems analysis and synthesis** to account for both closed-system dynamics, such as regulatory frameworks and resource constraints, and open-system dynamics, including innovation and collaboration.

The CAS framework outlined in the WCIF 2050 leverages **feedback loops** to ensure that infrastructure systems evolve in response to changing conditions and stakeholder needs. These feedback loops foster ongoing interaction between stakeholders, communities and the environment, enabling adaptive strategies that address both current challenges and long-term goals. For example, infrastructure agencies are encouraged to examine the relationship between policy intent, systemic dynamics and practical implementation, ensuring alignment with broader societal objectives.

Chapter 8: Ecological Infrastructure[9-11]

The WCIF 2050 provides a framework to recognise and value **ecosystem goods and services**, emphasising the integration of ecological health into human development and infrastructure planning. These services are categorised into:

- **Provisioning Services**: Tangible goods like food, fresh water and raw materials.
- **Regulating Services**: Functions that stabilise environmental conditions, such as air quality, climate regulation and pollination.
- **Cultural Services**: Non-material benefits, including recreation, tourism and aesthetic value.
- **Supporting Services**: Ecological processes like nutrient cycling and soil formation.

By framing ecosystems as infrastructure, the WCIF 2050 highlights their role in supporting human and environmental needs while recognising their co-benefits within interconnected systems. This approach underscores the importance of incorporating ecological considerations into infrastructure decision-making processes, aligning built and natural systems for long-term resilience and wellbeing.

3.2 Structuring the WCIS 2050

3.2.1 WCIS 2050: Crafting the strategy

The formulation of the Western Cape Infrastructure Strategy 2050 (WCIS 2050) requires an in-depth review of the latest research and practices in strategy development, execution and navigation. This approach is essential to achieve "coherence of strategy". Strategic coherence requires alignment between policies and actions[12], which is critical to avoiding reactive, short-sighted decisions from overshadowing well-planned strategic responses.

Strategic coherence is widely regarded as the cornerstone of effective strategic management. Its absence often leads to significant inefficiencies and disjointed outcomes in planning and execution[12]. In systems thinking[17], it parallels the concept of "wicked societal challenges", while in economics[18], it relates to "grand challenges". Both frameworks emphasise the importance of coherent strategies in addressing complex issues that demand innovative solutions[7] within ever-changing socio-economic landscapes[18,21,23]. Research underscores that coherence involves treating strategy as a seamless integration of policy and action. This integration is vital when addressing grand or wicked challenges[17,18], as it enables stakeholders to devise and implement[1] adaptive, novel responses tailored to dynamic and complex environments.

Sustainable competitive advantage hinges on leveraging both difficult-to-replicate physical assets and knowledge-based assets[13], while simultaneously building and nurturing dynamic capabilities. Dynamic capabilities are developed through the continuous process of creating, extending, upgrading, protecting and maintaining the relevance of all assets, both tangible (e.g., physical infrastructure) and intangible (e.g., intellectual property).

The development of dynamic capabilities involves refining the following core skills[13]:

- **Sensing and Shaping Opportunities and Threats** – The ability to identify and anticipate shifts in the environment.
- **Seizing Opportunities** – Acting decisively to capitalise on identified opportunities.
- **Enhancing, Combining, Protecting, and Reconfiguring Assets** – Effectively managing and transforming both intangible and tangible resources to maintain relevance and adaptability.

Dynamic capabilities also include the capacity to co-shape ecosystems to foster innovation, enabling the creation of new services, products, processes, and designs that align with long-term viability[13,14] and sustainability. Two critical measures are used to assess the efficacy of dynamic capabilities[13,15]:

1. **Technical Fitness** – Evaluates how effectively a capability performs its intended function, independent of its profitability.
2. **Evolutionary Fitness (or External Fitness)** – Measures how well a capability contributes to overall viability, considering both economic profitability and environmental sustainability (profit and planet).

By excelling in these areas, organisations can ensure they remain resilient and adaptable in an ever-changing landscape.

Together, technical fitness and evolutionary fitness, equip us to navigate complex socio-economic and ecological contexts[16,17]. They guide the development of strategic insights that ensure alignment with regulatory and institutional frameworks, which are essential for shaping emerging or new markets[16,17].

Moreover, these measures emphasise the importance of leveraging technology to address societal challenges. They direct focus toward facilitating critical technologies that exhibit two key attributes, namely:

- **Ubiquity**[19] – Ensuring technologies are widely accessible, integrated and decentralised across various sectors and communities.
- **Federation** – Promoting the collaborative and adaptive use of technologies to address diverse needs effectively.

These attributes are crucial for repurposing technologies to support and uplift the most vulnerable segments of society[17]. By embedding such considerations into strategic planning, we can create inclusive, adaptive systems that drive both innovation and equitable development.

In addition, innovation should consider the various criteria outlined in the "Sustainable Settlements Pre-feasibility Study" undertaken by DEA&DP. Specifically, the considerations of meeting constitutional obligations, cost of failure/ availability of a "PLAN B" delivery of service and impact of failure on people and the environment can be considered to frame the types of innovation suitable to the circumstances.

3.2.2 WCIS 2050: Building strategic infrastructure capabilities

In a globally networked and competitive landscape, organisations must embed tools for self-development and self-regulation to remain viable. This necessitates strategies that promote broader and deeper environmental scanning by moving beyond narrow search patterns and limited horizons[11,12]. However, achieving this shift is challenging, as traditional education systems and corporate training often reinforce narrow and constrained approaches to problem-solving and opportunity identification.

A critical consideration in adopting broader scanning strategies is the balance required to address resource limitations[12-19]. Expanding search horizons can strain available resources, making it essential to prioritise focus areas strategically. However, a far greater risk lies in the persistence of ingrained biases around certainty, predictability, and control[12-21]. These biases foster mechanistic planning approaches that rely on deeply flawed assumptions, restrictive filters and outdated problem-solving strategies. Such approaches can entrap organisations in rigid frameworks, limiting their adaptability and innovation in dynamic environments.

To thrive, organisations must embrace more adaptive and holistic planning paradigms that challenge entrenched assumptions and encourage open-ended exploration of opportunities and risks. This shift is critical for long-term resilience and success in an ever-evolving world.

The ability to recognise opportunities hinges not only on individual leadership capabilities, but also on the knowledge and learning capacities embedded within the organisation[23]. The practice of open innovation emphasises the need for broader and deeper search patterns that draw insights from the external environment. These patterns enable organisations to understand the dynamic flux of their contexts[13,17] and leverage these insights to drive innovation.

In today's interconnected society, network effects play a significant role, diminishing the relevance of traditional linear strategy models such as Porter's Five Forces[25] or the Five Ps of Strategy[26]. These frameworks often fail to address the complexities and fluidity of modern operating environments. In contrast, research on dynamic capabilities offers a decisive break from linear approaches by emphasising adaptability and responsiveness in the face of change[12].

For the WCIS 2050, it is critical to consider how networked communities form flexible value chain partnerships capable of responding to rapid shifts in their operating environments. These partnerships may include suppliers, local communities (with a focus on Women, Youth, the Elderly and Persons with Disabilities), complementors, regulators, standards bodies, educational and research institutions, and others.

Modern networked relationships demand strategies that integrate advanced methodologies, models, and technologies to build sustainable competitive advantages. Such strategies must prioritise the ongoing configuration and development of difficult-to-replicate assets, ensuring organisations remain agile and resilient in the face of uncertainty and change[12].

It is crucial to recognise that both public and private sector organisations often operate within hierarchical structures characterised by bureaucratic governance and compliance mechanisms. While intended to ensure accountability and order, these features frequently stifle innovation[12]. As a result, large organisations may identify business opportunities but fail to invest in them effectively. Research further highlights a preference for incremental innovation over radical innovation, reflecting a tendency to avoid high-risk, transformative changes.

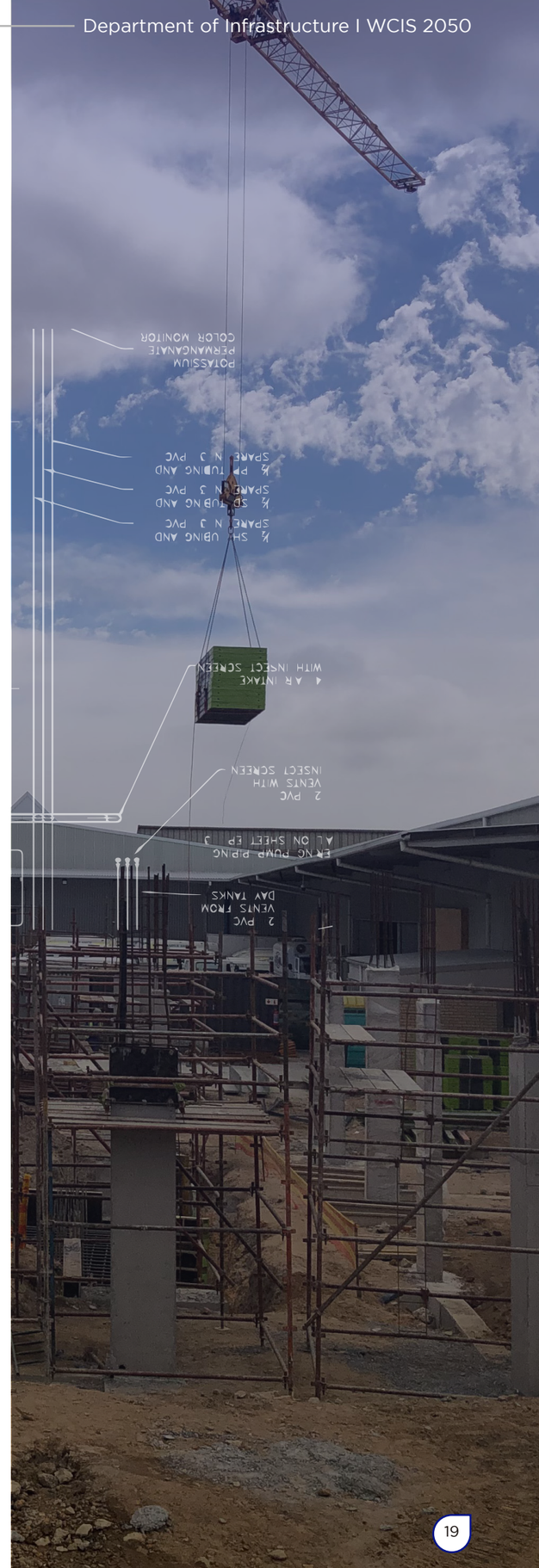
A common challenge is the misuse of governance as a scapegoat for inaction. Administrative routines are often cited to justify delays in decision-making, hindering the adoption of necessary innovations[12,13]. Similarly, organisations must address internal biases against external technologies, cultivating their absorptive capacities to recognise and harness external value in ways that benefit the entire system.

The WCIS 2050 emphasises these issues, advocating for partnerships founded on smart alliances that actively facilitate learning and skill development[23]. These strategic elements are critical for capturing value from innovation across entire value chains[11,13,17,18]. Moreover, the role of complementary assets and co-specialisation is increasingly recognised as a form of innovation in itself, particularly within emerging networked contexts[13,19]. By focusing on these priorities, organisations can break free from bureaucratic inertia and leverage innovation as a driver of growth and adaptability.

3.2.3 WCIS 2050: A model of navigation for uncertain contexts

The preceding sections outline methods for enhancing strategy crafting, execution, and navigation by integrating these components into a single, continuous process. This approach aims to improve the coherence of strategic management. The WCIS 2050 model builds on this foundation by emphasising the facilitation of innovation, described as "novel practices" [21] in the WCIF 2050, and linking these to the development of sustainable competitive advantage through dynamic capabilities. These capabilities involve the ongoing creation, extension, upgrading, protection, and maintenance of relevance for both physical and non-physical assets[12,13], such as intellectual property (IP).

The WCIS 2050 emphasises the importance of moving beyond narrow search patterns and horizons[12,13,] which have been shown to diminish the quality and diversity of decision-making. Limited search criteria reduce variety, inadvertently reinforcing entrenched linear biases centred on certainty, predictability, and control. These biases often hinder adaptive and innovative planning[12,13,18,19].



With this context, the WCIS 2050 model illustrates the flow of strategy within the institutional planning framework of South Africa's public sector. By harmonising strategic management[21] with compliance to policy directives, the WCIS 2050 promotes the adoption of modern, innovative practices, enhancing alignment and adaptability across governance structures. This integrated approach underscores the importance of balancing policy compliance with dynamic, forward-looking strategic management to drive sustainable growth and transformation.

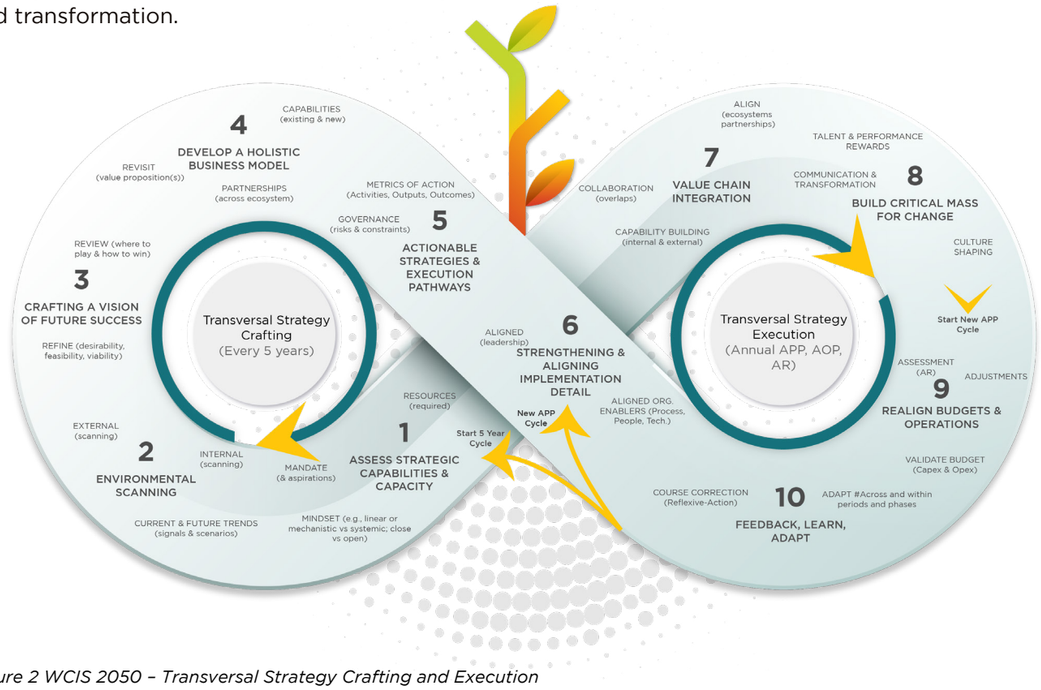


Figure 2 WCIS 2050 – Transversal Strategy Crafting and Execution

As illustrated in Figure 2, the strategic management process seamlessly connects strategic thinking, strategic planning, and strategic implementation. This integration is designed to align with the planning protocols of South Africa's public sector. The primary aim of the WCIS 2050 is to standardise planning practices across the sector and to offer a cohesive framework that promotes innovative practices throughout the infrastructure stakeholder value chains.

A brief review of the process shows that Activities 1 to 5 focus on crafting strategies, typically involving tools and methodologies for strategy development. Activities 6 to 10, on the other hand, relate to strategy execution, offering guidance on the key tasks and activities required for each phase.

Together, these activities are connected by structured review cycles, such as the five-year strategic planning cycle. Each year within this cycle is further divided into specific planning controls, such as the Annual Performance Plans (APPs), Annual Operational Plans (AOPs), and Annual Reports (ARs), which are mandated by the National Treasury (NT) and the National Department of Planning, Monitoring and Evaluation (DPME).

The periodic reviews, whether monthly, quarterly, annually, or every five years, ensure that feedback is incorporated into a continuous loop of reflexive-action. This means adapting and refining plans based on real-time insights and feedback from ongoing projects, ensuring that strategies remain responsive to changing conditions and priorities.

This cyclical, adaptive approach fosters a dynamic planning environment where strategy development and execution are constantly aligned and optimised for long-term success.

In summary, the WCIS 2050 aims to promote harmonisation, integration and innovation, while operating within the existing governance frameworks of South Africa's public sector.

The navigational steps of the WCIS 2050 are:

1. **Assess Strategic Capabilities & Capacity** – This step involves reflecting on internal strengths, resources and voices essential for co-creating and embedding relevant strategies into organisational mindsets and daily operations.
2. **Environmental Scanning** – This entails an authentic and comprehensive review of internal and external trends and patterns, encompassing the mandate, purpose and aspirations in the context of critical uncertainties.
3. **Crafting a Vision of Future Success** – This step focuses on developing a clear, desirable, and viable vision of success. By considering uncertainties and plausible scenarios, it helps determine "where to play" (specific markets, industries or sectors) and "how to win" (defining actions for success in the chosen areas).
4. **Develop a Holistic Business Model** – This involves understanding the ecosystem capabilities and partnerships required to execute the strategies, acknowledging the interconnectedness and dependencies within the WCG's infrastructure system.
5. **Actionable Strategies and Execution Pathways** – This step translates strategies into actionable plans that are ready for execution.
6. **Strengthening and Aligning Implementation Detail** – This involves aligning delivery units to implement the plans effectively, ensuring proper coordination and accountability.
7. **Value Chain Integration** – This refers to aligning key value chain actors at the project level, ensuring that all relevant stakeholders are integrated and working towards common goals.
8. **Build Critical Mass for Change** – This focuses on addressing performance, change, and cultural factors that are crucial for successful execution and aligning current capabilities with future needs.
9. **Re-align Budgets and Operations** – This step includes adjusting budget planning cycles and implementing corrective actions based on the evolving needs of the strategy.
10. **Feedback, Learn and Adapt** – This final step emphasises the importance of using feedback from various phases (monthly, quarterly, annually, or every five years) to inform adjustments and continuous improvement across the entire process.

These steps are designed to guide the strategic management process within the WCIS 2050, ensuring that strategies are not only formulated but are also effectively implemented, reviewed and adapted over time.

Chapter 4 Governance and Oversight

4.1 Introduction

Public sector governance encompasses accountability for achieving specific goals, which extend beyond service delivery to include broader considerations such as the societal impact of policies (e.g., policy outcomes or value for money). Effective governance relies on diverse mechanisms, including:

- **Structures** that clearly define the roles and responsibilities of stakeholders.
- **Approaches** that enhance the capacity and capabilities required to fulfil these responsibilities.
- **Tools** such as robust systems for internal controls and external accountability[1-3].
- **Ethics** to enable and ensure ethical, safe and innovative uses of data, including AI.

This integrated approach ensures that governance aligns with both immediate objectives and long-term societal outcomes.

At its core, **governance** aims to cultivate an environment of accountability. Accountability, in turn, is often described as a **"social relationship in which an actor feels an obligation to explain and justify their actions to a significant other"**[2]. Modern accountability encompasses both **internal** and **external** dimensions:

- **Internal accountability** focuses on internal relationships, such as those between principals and agents, as well as oversight and execution mechanisms.
- **External accountability** extends to the broader public sector's responsibility to stakeholders, including the general public, private businesses, NGOs and NPOs.

Ultimately, governance serves as the foundation for **integrity and trust** in the public sector, ensuring transparency, ethical conduct, and a commitment to serving the public good.

The **WCIF 2050** provides a comprehensive analysis of the legislative, regulatory and policy frameworks shaping the infrastructure landscape in South Africa. Additionally, it delves into the multi-layered governance structures essential for ensuring successful infrastructure delivery[2]. These governance layers include:

WCIS 2050 specific governance aspects, which are directly required for the long-term successful implementation of the WCIF 2050, and as foreseen in the WCIIP 2050.

The governing rules and regulations applicable to the DOI's infrastructure mandate. These constitute mostly mandatory rules and regulations that must be complied with in a specific manner.

Both **specific layers of governance** must be considered within the broader governance framework applicable to South Africa, such as the **King IV Framework for Corporate Governance.** The King IV Framework's emphasis on value-for-money and outcomes-based governance is extensively addressed in the **WCIF 2050**, highlighting its alignment with the overarching principles of the South African Constitutional framework. Also, King IV aspires to the following governance outcomes: ethical culture, good performance, and effective control and legitimacy. The King IV outcomes-based approach emphasises the disclosure not of what practices have been implemented, but rather the impact or effect of those practices.

The **WCIF 2050** further underscores the critical importance of **intergovernmental cooperation, seamless coordination, collaboration,** and **integration** among all infrastructure role-players and stakeholders. To address systemic risks and ensure robust infrastructure governance, the following measures are emphasised:

- **Interdisciplinary and cross-sectoral collaboration** to bridge gaps between various fields and sectors.
- The adoption of a **risk-scanning tool or system** to proactively identify, assess and manage potential risks.
- **Active stakeholder engagement** throughout all phases of infrastructure planning, delivery, and management to ensure alignment, accountability, and shared ownership.

Figure 1: Multiple Layered Infrastructure Related Governance Framework

4.2 Addressing the Infrastructure Governance Strategy Requirements

In order to address the governance requirements to successfully implement the WCIF 2050, WCIS 2050 and WCIIP 2050, the WCG's Cabinet adopted a specific infrastructure focused governance framework in October 2024, by establishing the Infrastructure Ministerial Committee (IMC) and the Infrastructure Technical Committee (ITC). This **governance framework** establishes an infrastructure-focused governance body that integrates both the **executive** and **administrative** functions of the WCG. It is mandated to facilitate:

- **Interdepartmental cooperation and coordination** across various levels to ensure alignment and efficiency.
- The **integration of infrastructure** as a core component within other key Western Cape strategies, such as the **G4J** Strategy, particularly in identified growth sectors like energy, waste management, disaster management, safety, health, education and social development. This is achieved while maintaining **clear roles and responsibilities** to uphold accountability.
- **Engagement on infrastructure matters** beyond government, incorporating both:
  - **Structured mechanisms,** such as advisory panels, for informed decision-making.
  - **Unstructured mechanisms,** like general stakeholder sessions, to foster inclusivity and open dialogue.

4.3 The Infrastructure Ministerial Committee (IMC) and Supporting Structures

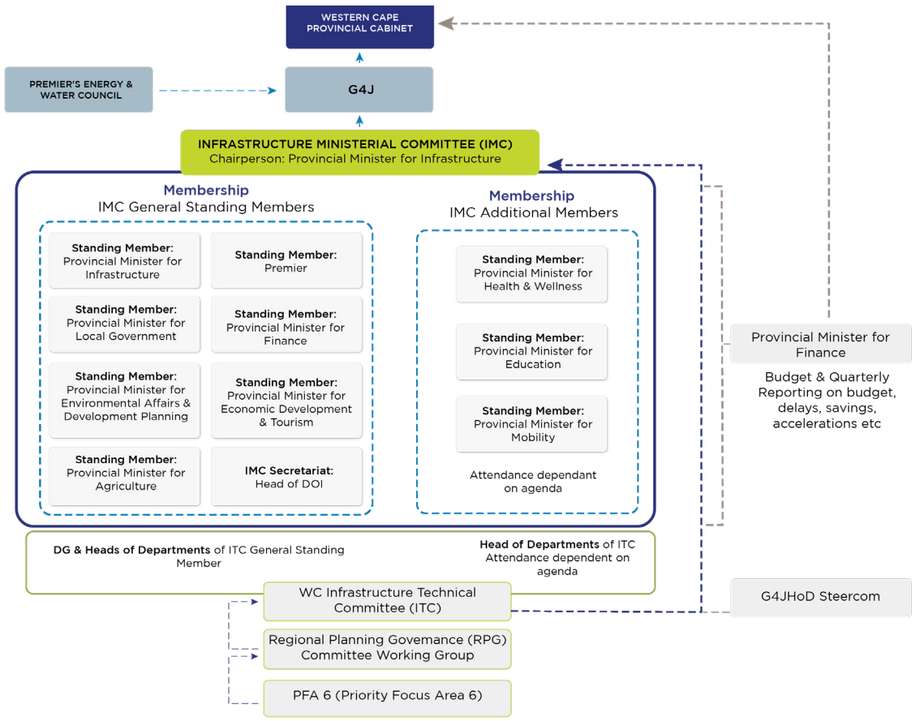


Figure 2: WCIF 2050, WCIS 2050 & WCIIP 2050 Governance Structure

On an executive level, the IMC has been established as a sub-committee of the WCG's Cabinet, coordinating and directing infrastructure planning and delivery across departmental mandates, focusing on economic growth, job creation, and solving infrastructural challenges to foster cohesive, long-term infrastructure development across the Western Cape. The IMC has been established to ensure effective governance and seamless implementation of the WCIF 2050 and the G4J Strategy as it relates to infrastructure.

The WCIF 2050, the WCIS 2050 and the WCIIP 2050 guide the IMC's operational framework through a three-pillar approach:

- WCIF 2050 (The Framework): Establishes the overarching structure, governance, and core principles for infrastructure delivery, setting a long-term vision.
- WCIS 2050 (The Strategy): Defines specific priorities for short-, medium-, and long-term infrastructure development, aligning with the G4J's objectives.
- WCIIP 2050 (Pipeline and Implementation Plan): Translates the framework and strategy into actionable projects with a phased five-year approach and annual reviews, detailing project timelines, costs and progress metrics for IMC reference and discussion.

The **Infrastructure Ministerial Committee (IMC)** is chaired by the Minister of Infrastructure and comprises a core group of executive leaders, including:

- The Premier and Ministers overseeing Finance, Local Government, Environmental Affairs and Development Planning, Economic Development and Tourism, and Agriculture.
- The Western Cape Ministers of Education, Health and Wellness, and Mobility, who are directly involved in key aspects of the infrastructure pipeline. Their participation in IMC meetings is agenda-dependent, ensuring their engagement is focused on matters relevant to their respective portfolios.

This composition allows for targeted contributions, strategic alignment and efficient decision-making in the planning and implementation of infrastructure initiatives.

To foster effective governance and accountability, the IMC is supported by the **Infrastructure Technical Committee (ITC)**, responsible for operational execution and coordination on an administrative level chaired by the Head of Department of Infrastructure. Representation on the ITC mirrors the executive representation arrangement, with the Western Cape Director General, and Heads of Departments of Finance, Local Government, Environmental Affairs and Development Planning, Economic Development and Tourism, and Agriculture forming the standing members of the ITC. Heads of Department for Education, Health and Wellness, and Mobility will participate in ITC meetings as needed, depending on the relevance of the meeting agenda to their respective portfolios.

The **Regional Planning Governance (RPG) Committee** will report into the ITC. It will serve as a senior management-level technical working group dedicated to facilitating the coordination, integration and implementation of regional infrastructure and planning initiatives across the Western Cape. The RPG's primary role is to operationalise the WCSDF 2025, WCIF 2050, WCIS 2050, and WCIIP 2050 by ensuring that regional-level priorities are effectively aligned with provincial and national frameworks. The RPG will focus on integrating diverse sectoral strategies to promote spatial transformation, economic growth, and sustainable development. It will also monitor regional risks, evaluate vulnerabilities and identify growth opportunities, ensuring that infrastructure delivery aligns with the broader objectives of the G4J Strategy. The RPG will play a pivotal role in fostering collaborative planning, addressing inter-jurisdictional challenges, and providing technical recommendations to the ITC to enhance decision-making at the provincial level.

4.4 IMC Consultation and Stakeholder Engagement Framework

Chapter 12 of the WCIF 2050 recommends incorporating advisory panels at various levels of governance through legislative and policy instruments to operationalise its framework. These panels would leverage Communities of Practice (COPs) to actively contribute across the key stages of infrastructure development, including innovation, planning, execution and implementation.

The COPs would complement advisory panels that focus on specialised areas such as financing, investment and partnerships, functioning at higher levels within the governance framework. This multi-layered approach promotes collaborative input and knowledge sharing across all stages of the infrastructure lifecycle, from conceptualisation to execution, ensuring inclusivity, innovation, and alignment with strategic goals.

The concept of COPs was introduced by educational theorists Jean Lave and Etienne Wenger in 1991. COPs refer to groups of individuals who share a common concern, passion, craft or profession[46] and come together to deepen their expertise and knowledge in that area. While the format and application of COPs can vary widely, they are unified by three core elements:

- **Domain:** A shared domain of interest provides the group with its identity and focus.
- **Practice:** Members are practitioners who develop a collective repertoire of resources, including experiences, stories, tools, and methods for solving recurring challenges, essentially creating a shared practice.
- **Community:** Members actively engage in collaborative activities, discussions, and mutual support, fostering an environment of trust and shared learning[5].

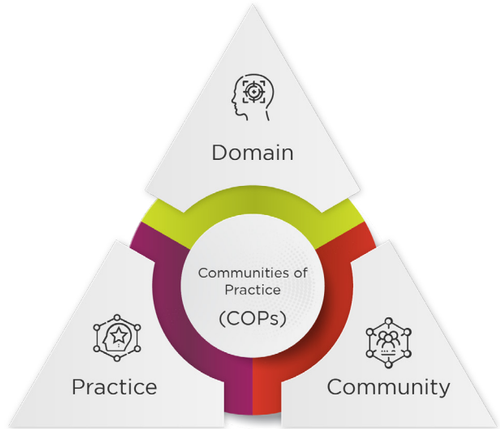


Figure 3: Three key elements of COPs

To some extent the IMC, ITC and RPG already operate as highly structured public sector participation peer groups within the infrastructure domain. To further broaden peer and public participation, consultation and interaction, the governance structure of the WCIF 2050, WCIS 2050, and WCIIP 2050 will incorporate a dynamic mix of advisory panels, peer participation mechanisms, and community engagement opportunities.

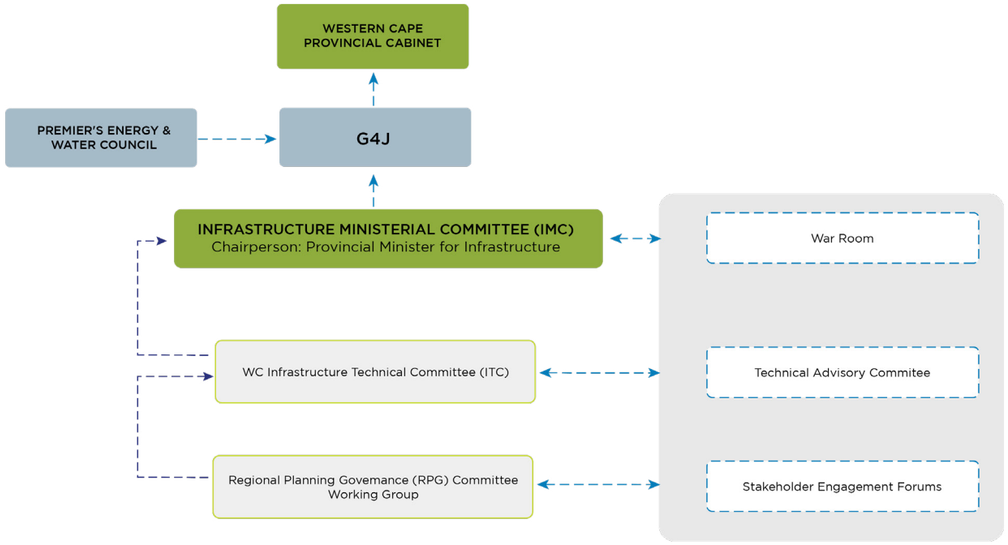


Figure 4: WCIF 2050, WCIS 2050 & WCIIP 2050 Stakeholder Engagement Structure

At the IMC level, the committee will be supported by a high-level strategic Community of Practice (COP), operating as an **Infrastructure War Room**. The War Room will consist of academics, senior advisory professionals, and private sector leaders with a demonstrated interest and proven track record in the infrastructure domain. The War Room will engage with the IMC on predetermined themes, facilitating the open exchange of ideas, experiences, and best practices to deepen the collective understanding of shared infrastructure challenges and opportunities.

At the ITC level, the committee will be bolstered by a **Technical Advisory Committee** comprising experts from various disciplines, including but not limited to engineering, banking and finance, legal and contract structuring, economics, and environmental science. This diverse expertise will ensure that the ITC benefits from a multidisciplinary perspective on technical aspects of infrastructure planning and implementation.

At the RPG level, the working group will engage through **Stakeholder Engagement Forums**. These forums will be structured on a project-specific basis to ensure they address the unique needs and concerns of relevant communities, with a focus on Women, Youth, the Elderly and Persons with Disabilities, and stakeholders for each infrastructure initiative.

This tiered support system ensures that all governance levels, IMC, ITC, and RPG, are equipped with the specialised knowledge, strategic insights and community input needed to drive effective infrastructure development.

4.5 Governance Accountability Framework for the IMC, ITC and RPG

The mandate, scope and performance of the IMC, ITC and RPG is structured in a formal governance model consisting of back-to-back formal written terms of reference and service level agreements (SLAs) that formalise expectations, roles and accountability. The SLAs reflect the WCG's values, such as accountability, integrity and responsiveness with specific reference to:

- Streamlining project execution and fostering inter-departmental respect, minimising transactional burdens.
- Performance delivery, risk reporting and escalation protocols are included to ensure projects are completed on time and within budget, optimising both public trust and tangible outcomes for communities.

The IMC's mandate encompasses executive oversight of infrastructure policies, strategy development, and operational delivery focussing on:

- **Pipeline Development:** Oversees an infrastructure pipeline (inclusive of public and private projects) to guide long-term economic growth and development, spatial transformation and investment attraction. Engages with additional stakeholders such as Infrastructure South Africa, DBSA, World Bank, and private sector representatives for project-specific insights through formal infrastructure advisory committees.
- **Policy and Strategy Endorsement:** Reviews and recommends infrastructure policies and strategies for Cabinet approval, ensuring alignment with the broader WCIF 2050, the WCIS 2050 and the WCIIP 2050.
- **Risk Mitigation and Progress Monitoring:** Identifies risks, monitors progress, and addresses delivery obstacles in infrastructure initiatives, delivering quarterly reports as part of the oversight structure.

The ITC's mandate encompasses strategic oversight of infrastructure policies, strategy development, and operational delivery focussing on:

- **Integrated Planning and Delivery:** Coordinates infrastructure planning and execution across various government levels and the private sector. Facilitates interdepartmental infrastructure planning and coordination to streamline infrastructure delivery.
- **Policy and Strategy Development:** Provides technical recommendations on norms, standards, and policies, addressing legislative gaps.
- **Funding and Financing:** Supports and coordinates technical inputs for funding applications. Explores viable financing options in collaboration with Provincial Treasury.
- **Research and Futures Planning:** Leads research on technical innovations and future infrastructure needs. Aligns efforts with the WCIF 2050, the WCIS 2050 and the WCIIP 2050 to ensure forward-thinking planning.
- **Project Review and Monitoring:** Regularly assesses project progress through quarterly technical reviews, to ensure alignment with the WCIF 2050, the WCIS 2050 and the WCIIP 2050.
- **Risk Management:** Identifies, monitors and addresses technical risks associated with infrastructure projects.
- **Regulatory Compliance and Best Practices:** Ensures compliance with technical standards and promotes the implementation of best practices across projects.

The RPG's mandate encompasses operational oversight of infrastructure policies, strategy development, and operational delivery focusing on:

- **Regional Coordination and Development:** Oversees and coordinates regional infrastructure and development efforts to ensure cohesive planning and sustainable outcomes.
- **Alignment with Strategic Goals:** Aligns infrastructure policies with strategic regional goals to address current challenges and future opportunities.
- **Strategy Development:** Develops strategies to foster resilience, competitiveness and sustainable growth within the region.
- **Operational Delivery:** Facilitates the operational delivery of strategies to ensure planned projects are implemented.
- **Stakeholder Integration:** Integrates diverse sectoral efforts, uniting multiple stakeholders, including government, private entities, and civil society under a common governance framework.
- **Enhance Regional Wellbeing:** Enhances the socio-economic and ecological wellbeing of the region through comprehensive and collaborative planning and execution.

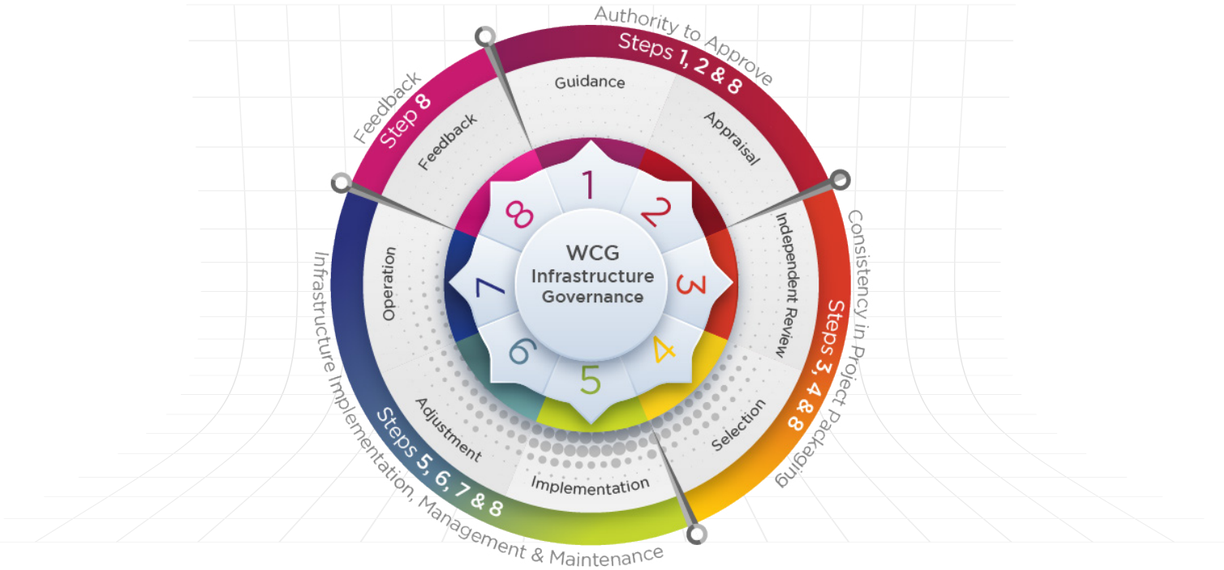


Figure 5: WCG's harmonised WCIF 2050, WCIS 2050 and WCIIP 2050 Governance Model

Figure 5 illustrates the integrated governance model, differentiating between various roles and responsibilities within the governance framework. It visually represents the interconnected steps required to ensure effective governance and accountability in infrastructure planning, implementation and management. The steps, as indicated by the numbered segments in Figure 5, are:

1. **Guidance**
2. **Appraisal**
3. **Independent review**
4. **Selection**
5. **Implementation**
6. **Adjustment**
7. **Operation**
8. **Feedback**

The governance model emphasises a structured approach through four key stages, each incorporating multiple steps as explained above:

- **Authority to Approve:** This encompasses the initial stages of guidance and appraisal (Steps 1 and 2), ensuring strategic alignment and approval processes are in place.
- **Consistency in Project Packaging:** Achieved through independent review and selection (Steps 3 and 4), this phase ensures project proposals are rigorously vetted and aligned with the broader infrastructure strategy.
- **Infrastructure Implementation, Management and Maintenance:** This phase focuses on the execution and lifecycle management of infrastructure projects, including implementation, adjustments as required, and operations (Steps 5, 6, and 7).
- **Continuous Feedback:** Embedded throughout the governance model, feedback (Step 8) ensures a cycle of improvement by informing and refining governance processes across all stages(please see more of this in Chapter 9).

This iterative model integrates checks and balances to ensure that governance processes remain robust, accountable, and adaptable. Feedback loops allow for real-time monitoring and adjustments, fostering transparency and continuous improvement throughout the lifecycle of infrastructure projects.

To ensure accountability, the various steps in the governance model are assigned to specific role-players. These assignments prioritise governance activities and enable tools that align with each governance mandate. Table 1 provides a detailed explanation of the allocation of governance activities to specific role-players, alongside the governance tools and aides necessary to implement these mandates effectively. This structured approach ensures alignment with the strategic goals of the WCIF 2050, while optimising the overall infrastructure governance processes in the WCIS 2050 and WCIIP 2050.

	AUTHORITY TO APPROVE	CONSISTENCY IN PROJECT PACKAGING	INFRASTRUCTURE IMPLEMENTATION, MANAGEMENT & MAINTENANCE
Governance & management		ITC | RPG	RPG | Depts. | Munics. | Other
Activities	Guide, Appraise, Feedback (see **1**, **2+8** in governance model)	Review, Select, Feedback (see **3**, **4+8** in governance model)	Implement, Adjust, Operate, Feedback (see **5**, **6**, **7+8** in governance model)
Tools & Aids	• Prescribe compliance • Centralised Policy prescripts • Panoptic principles • Prioritisation model • Gigamap driving Futures-oriented infrastructure-as-a-service for WCG	• Policy & prescript validation • Formats validation • Panoptic principles validation • Document variance • Gigamap driving Futures-oriented infrastructure-as-a-service for WCG	• Prescribed formats and management of Asset level M&E • Gigamap driving Futures- oriented infrastructure-as-a-service for WCG

Table 1: Prioritisation, Governance, Activities & Enabling Tools allocation within the Infrastructure Governance Model

Expanding on the integrated governance model discussed, Table 1 highlights the prioritisation, governance, activities, and enabling tools associated with each phase of the WCIF 2050 governance process. Table 1 organises these processes into three distinct governance phases: Authority to Approve; Consistency in Project Packaging; and Infrastructure Implementation, Management and Maintenance. It specifies the corresponding governance structures, activities, and tools that underpin each phase. Together, these governance phases ensure a systematic and accountable process for infrastructure project approval, planning and execution, aligning with the strategic objectives of the WCIF 2050.

4.6 Conclusion

The WCIF 2050 and WCIS 2050 provide a robust governance framework designed to address the multifaceted challenges of infrastructure planning, delivery, and management. It sets out a cohesive strategy that integrates long-term vision, strategic prioritisation and actionable implementation. By emphasising the principles of accountability, transparency and intergovernmental cooperation, the WCIS 2050 ensures that governance mechanisms are not only effective but also aligned with the broader goals of economic growth, social development and sustainability.

The establishment of the Infrastructure Ministerial Committee (IMC), Infrastructure Technical Committee (ITC) and Regional Planning Governance (RPG) Committee structures outline the WCG's commitment to fostering coordination and collaboration across all levels of infrastructure governance. These structures provide a comprehensive approach that bridges executive oversight, technical expertise and community engagement, ensuring that infrastructure initiatives are both strategic and inclusive. The IMC's executive leadership, supported by the ITC and RPG, facilitates seamless integration of diverse sectoral priorities within the overarching WCIF 2050 governance model.

Incorporating Communities of Practice (COPs) into the governance framework enhances its adaptability and inclusivity. By drawing on the expertise of academics, private sector leaders, and community stakeholders, the governance model ensures that decision-making processes are informed by a broad spectrum of perspectives. This tiered engagement strategy promotes innovation, shared ownership and alignment with strategic goals, thereby enhancing the overall effectiveness and responsiveness of infrastructure governance.

Ultimately, the WCIS 2050's governance model exemplifies a forward-thinking approach to infrastructure development, grounded in integrated decision-making, accountability, strategic alignment, and continuous improvement. By integrating risk management, stakeholder participation, and performance monitoring into every stage of the infrastructure lifecycle, the governance model addresses current challenges and anticipates future needs. This comprehensive governance approach positions the WCG as a leader in infrastructure development, ensuring that its policies and initiatives deliver long-term value to its residents and stakeholders.

"The WCIF 2050 and WCIS 2050 provide a robust governance framework designed to address the multifaceted challenges of infrastructure planning, delivery, and management."

5.1 Introduction

Stakeholder engagement and partnerships form the backbone of the WCIF 2050, WCIS 2050 and WCIIP 2050 to deliver cohesive, inclusive, and sustainable infrastructure. Stakeholder engagement is integral to this process, as it involves identifying, analysing, and collaborating with diverse groups to ensure their needs and actions align with overarching infrastructure goals. Through years of extensive consultations, the WCIF 2050 has fostered a holistic understanding of stakeholder dynamics, enabling the WCIF 2050, WCIS 2050 and WCIIP 2050 to deliver infrastructure that resonates with the unique challenges and opportunities within the Western Cape.

The Infrastructure Framework Review (IFR), initiated in 2021, played a pivotal role in refining the WCIF 2050's stakeholder engagement strategies. Over a 24-month period, interactive sessions with stakeholders, including provincial departments, municipalities, national government, state-owned enterprises (SOEs), private sector entities, and community representatives, generated valuable insights for aligning infrastructure delivery with future-focused goals. These engagements, encapsulated in the WCG's high-level stakeholder map, emphasise the interconnected roles and shared responsibilities of these diverse entities in building a resilient infrastructure ecosystem.

Central to the WCIF 2050 and WCIS 2050 is the recognition that infrastructure is more than just physical structures, as it is an interconnected ecosystem of stakeholders that must work collaboratively. Equitable partnerships, as emphasised in the WCIF 2050 and WCIS 2050, are essential for fostering shared value and sustainable development. By promoting inclusive, innovative, and resilient partnerships, the WCIF 2050 and WCIS 2050 will ensure that public and private sector priorities align in ways that balance profitability with societal advancement, creating a robust foundation for long-term infrastructure success.

5.2 Stakeholder engagement and consultation insights

Stakeholder engagement is the process of identifying, analysing, planning, and implementing actions to collaborate or integrate with stakeholders. It is central to strategic planning since it facilitates:

- Understanding stakeholders' needs and timing.
- Understanding how stakeholders are interacted with.
- Understanding how stakeholder plans and actions impact WCIF 2050 objectives.

The development of the WCIF 2050 was underpinned by extensive stakeholder engagement sessions conducted over several years. These sessions aimed to align and enhance the WCG's infrastructure delivery. In 2021, the Department of Infrastructure initiated a comprehensive stakeholder review process[6], referred to as the Infrastructure Framework Review[7]. This large-scale effort involved a systematic mapping of infrastructure-specific stakeholder inputs through interactive and critical engagement sessions held over a 24-month period[8].

The stakeholder engagement process centered on fostering collaborative and integrative infrastructure approaches across the landscape. These themes were articulated and prioritised to ensure that infrastructure planning and delivery were cohesive, inclusive, and future-focused[9]. The outcomes of this engagement are visually summarised in the high-level stakeholder map depicted in Figure 1, showcasing the interconnected roles and contributions of various stakeholders.

WCG High-level Stakeholder Map

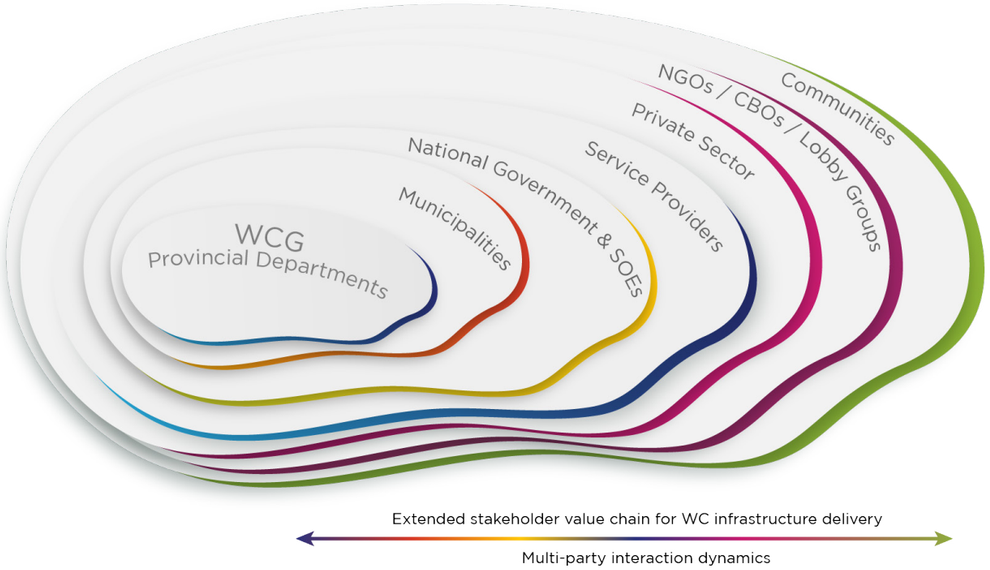


Figure 1: WCG Infrastructure Stakeholder Map

The diverse stakeholder groupings were intentionally structured to ensure transversal relevance and broad representation across the WCG's infrastructure ecosystem. This design approach was guided by a strong emphasis on citizen-centricity and inclusivity. These themes are succinctly captured and summarised in Table 1, highlighting the strategic intent to integrate diverse voices and needs into infrastructure planning and delivery.

WCG High-level Stakeholder Participation Map(as revised February 2025)

Transversal Value	Who	Why
Infrastructure for the WCG must be conceptually and contextually sound, ensure novel practice, and be innovative in its integrative value. Collective wisdom, practical insights and a clear understanding of differentiated needs and expectations from the WC ecosystem can be better understood and planned in a collaborative way.	WCG Provincial Departments	The WCG has a direct impact on the infrastructure ecosystems of the Western Cape. It is accountable for implementing policy metrics regarding governance, planning, design, delivery, and maintenance of infrastructure. The WCG holds critical insights into sectoral infrastructure practices.
	Municipalities	Municipalities play a key role in infrastructure ecosystems within their jurisdictions. They are responsible for implementing local policies and practices in governance, design, delivery, and maintenance of infrastructure, bringing unique local insights into the planning process.
	National Government and SOEs	These stakeholders influence infrastructure development through policy directives, financial investments, and technical expertise. Their role is vital in driving major infrastructure projects and ensuring alignment with national priorities and regional needs.
	Service Providers	Service providers, including private sector entities and NGOs, contribute directly to the planning, design, and delivery of infrastructure. They operate across various levels, adding value through innovation and technical capabilities within the ecosystem.
	Private Sector	The private sector plays a pivotal role in the infrastructure ecosystem by providing financial investments, technical expertise, and innovative solutions. They contribute directly to the planning, construction, operation, and maintenance of infrastructure, often driving efficiency and innovation.
	NGOs / CBOs / Lobby Groups	Participation in the Community of Practices to monitor the implementation of Just Transition Climate Change principles in the distribution, procedural and restorative justice of previously disadvantaged groups across the province.
	Communities	Communities are the ultimate beneficiaries of infrastructure. Their voices and experiences are essential in shaping infrastructure design and implementation through an empathetic and participatory approach. Importantly, the explicit needs of the Constitutionally prioritised groups of Women, Youth, the Elderly and Persons with Disabilities who often have very different user patterns, service standards and accessibility needs for infrastructure and are generally marginalised by standard public participation processes will be emphasised.

Table 1: WCG Stakeholder Map

Chapter 6 of the WCIF 2050 focuses on stakeholder management under the theme of **"Infrastructure as an Ecosystem"**, emphasising the interconnected and interdependent nature of the entities involved in the WCG's infrastructure value chain. It highlights the concept that an ecosystem is an economic community supported by a foundation of interacting stakeholders who form the 'organisms' of the infrastructure world.

This ecosystem is characterised by a complex, relational structure with a high degree of reciprocal dependence. Over time, stakeholders within this ecosystem co-evolve, refining their roles and capabilities while aligning with the strategic direction set by the WCG. This dynamic interaction fosters coordination and collaboration, which are essential to generating and distributing value throughout the network. The approach ensures that the infrastructure ecosystem remains adaptive, sustainable, and oriented toward collective benefit.

Stakeholder engagement lies at the heart of the scaled transformation envisioned by the WCG and the WCIF 2050. This strategic reorientation views stakeholder engagement as a critical mechanism for enhancing both the relevance and effectiveness of infrastructure projects while fostering trust among diverse parties. Building this trust is essential to achieving resilient, inclusive, and sustainable outcomes that deliver value to all stakeholders.

However, the process of stakeholder engagement faces several notable challenges, as highlighted in the Infrastructure Framework Review[52-57]:

a. **Preference for Established Stakeholders**: Engagement often favours stakeholders with existing forms of influence, such as those with well-established relationships, authority, or financial resources. These biases risk sidelining contributors that are less prominent but equally important.

b. **Constraints of Existing Processes**: Current planning and procurement frameworks, such as the PFMA and MFMA budgetary processes, offer limited flexibility for meaningful public engagement. These frameworks prioritise efficiency and cost control, leaving little room for participatory approaches.

c. **Inclusivity of Peripheral Stakeholders**: Smaller, peripheral stakeholders, such as local community groups, individual advocates, independent researchers, and small businesses, must be actively included in the engagement process. Their unique perspectives are critical to fostering holistic and equitable outcomes.

d. **Fluidity of Stakeholder Roles**: Stakeholder distinctions should not be treated as rigid boundaries. Instead, stakeholders should be recognised as niche partners within a broader, interconnected value chain, where collaboration across boundaries strengthens outcomes.

e. **Addressing Tensions and Disagreements**: Frictions or disagreements are inevitable in stakeholder interactions, whether between local community groups and municipal officials, or between project funders and environmentalists. However, these tensions present opportunities for growth, enabling the development of empathetic worldviews and innovative solutions.

f. **Beyond Compliance in Public Participation**: Public participation must transcend mere regulatory compliance. Treating it as a box-ticking exercise stifles innovation and diminishes the resilience and sustainability of infrastructure projects. Genuine engagement enriches the design and implementation of projects, ensuring their long-term success.

These insights have led the WCIF 2050 to define stakeholder engagement as "a process of interacting with individuals or groups who have an interest in or are affected by infrastructure projects in the Western Cape"[58]. This definition reflects a deliberate commitment to inclusivity and collaboration in infrastructure planning and implementation. The adoption of the Panoptic Principles further establishes the WCIF 2050's dedication to ensuring that all stakeholders are accurately and adequately represented throughout the process.

The WCIF 2050's Panoptic Principles guide the development and implementation of stakeholder engagement strategies through the following core themes[59]:

1. **Diversity of Ideas and Perspectives**: Stakeholders are encouraged to contribute diverse ideas and perspectives to facilitate innovative and ground-breaking infrastructure solutions. This diversity enriches decision-making and fosters creative approaches to complex challenges.
2. **Inclusivity and Ownership**: Actively involving diverse community members in planning and decision-making ensures that infrastructure meets the needs of all stakeholders. This approach fosters a sense of ownership and trust, critical for local development and creating new opportunities for communities.

3. **Accessibility and Equity**: Infrastructure and services must be spatially just and accessible to all community members, regardless of their location or socio-economic status. This principle aims to reduce inequalities and promote equitable development across the region.
4. **Administrative Adaptability**: Adapting financial and administrative prescripts to allow for collaborative public participation can enhance innovation in infrastructure projects. The use of online WCIF 2050 tools and models further facilitates efficient and inclusive stakeholder engagement.
5. **Comprehensive Stakeholder Mapping**: Expanding stakeholder groups to encompass the entire infrastructure value chain ensures holistic and informed decision-making. Comprehensive stakeholder involvement strengthens the ecosystem and enhances the quality of infrastructure outcomes.
6. **Iterate Strategy to Practice**: Feedback loops across the project lifecycle are essential to refine and optimise the Western Cape's infrastructure ecosystem. These iterative processes ensure that strategies remain relevant and adaptive to changing conditions and stakeholder needs.

By embedding the Panoptic Principles into its stakeholder engagement framework, the WCIF 2050 and WCIS 2050 seek to create a collaborative, equitable and innovative infrastructure ecosystem. This approach will enhance project outcomes and also strengthen trust, ownership and resilience across all levels of engagement.

5.3 Aligning stakeholder engagement theory and practice

Research highlights the critical role of stakeholder engagement across a wide range of organisational contexts like: (a) value creation[5-7], (b) strategic planning and decision-making[8-10], (c) innovation[11-17], (d) learning and knowledge creation[17-20], (e) accounting and reporting[20,21]; (f) corporate social responsibility and sustainability[22-25]; and (g) politics and democratic principles[13,29,34,41] of stakeholder engagement.

The reflection of the WCIF 2050 stakeholder engagements[1] offer remarkable similarities to the research where key sources of disagreement tend to flow from[48] prior history of conflict or cooperation; an incentive for stakeholders to participate; power and resource imbalances; leadership; and institutional design. From these underlying factors, essential features of successful collaborative stakeholder engagement can be defined as[48] (a) face-to-face dialogue; (b) trust building tools and platforms; and (c) commitment toward shared understanding.

Evidence from both research and practice observe ongoing ineffectiveness of stakeholder engagement. It suggests that authentic stakeholder engagement must at least satisfy conditions like[46,47] urgency or high priority; have real disagreement among parties; and inter-agency cooperation. In the context of the WCIF 2050, these conditions are particularly critical as they reflect the complexity of modern, networked ecosystems. The WCIF 2050 emphasises stakeholder engagement strategies that leverage the following mechanisms to address these challenges[46]:

- **Multi-Stakeholder Platforms**: These platforms bring together diverse experts and stakeholders across disciplines, ensuring that complex problems are tackled through a wealth of beneficial knowledge, perspectives and experiences. Such platforms are vital for addressing the multi-dimensional nature of infrastructure ecosystems.
- **Systemic Holism**: **Whole-of-Government** and **Whole-of-Society** approaches are essential to transcend traditional silos and enhance existing institutional arrangements. This holistic perspective fosters integrated solutions that are responsive to the interconnectedness of stakeholders and systems.
- **Collaborative Governance**: As cited extensively in research, collaborative governance offers a constructive alternative to adversarial or managerial approaches in policymaking and implementation. It fosters collective forums where public and private stakeholders engage in **consensus-oriented decision-making**. This model promotes cooperation, transparency and shared responsibility, aligning efforts to achieve common goals.

Research increasingly distinguishes **stakeholder engagement** from **stakeholder management**[26], emphasising their unique roles and implications. Stakeholder engagement is proposed as inherently morally positive when it involves recognition, respect, and the act of doing good[28]. This includes empowering stakeholders[29] and actively considering their wants, needs, and capabilities[30]. Such approaches foster trust, inclusivity, and meaningful collaboration.

However, caution is warranted. Businesses often make implicit assumptions that their "moral actions" are inherently oriented toward the greater public good[31]. This assumption suggests that what benefits the business will automatically benefit all citizens, a perspective that can lead to unintended consequences and misplaced priorities.

A **pragmatic view** of stakeholder engagement focuses on action and problem-solving in practice. It emphasises improving stakeholders' quality of life and addressing real-world challenges collaboratively. This perspective aligns engagement efforts with tangible outcomes that enhance the wellbeing of those involved[37,38].

Nevertheless, the literature also warns of the **dark side of stakeholder relations**[39-45], where conflicts can arise from differing goals, expectations or clashing cultural norms. These tensions highlight the complexities of stakeholder dynamics and the importance of managing disagreements constructively to prevent them from undermining collaboration and progress.

Despite the inherent fragmentation in approaches to stakeholder engagement, most research and practice converge on a combination of moral, strategic, and pragmatic positions[41-45,50]. This aligns seamlessly with the principles underpinning the **WCIF 2050**, its overarching strategy (**WCIS 2050**), and its implementation framework (**WCIIP 2050**).

Building on this foundation, a robust **public-private stakeholder toolkit** was co-developed to support engagement activities throughout all phases of the stakeholder implementation process[49]. This model integrates both scientific research and practical insights, ensuring it is both theoretically sound and user-friendly. Its design prioritises simplicity and accessibility, enabling seamless application across diverse stakeholder interactions. The toolkit serves as an **integrative tool**[49] to navigate the complexities of stakeholder engagement effectively, as illustrated in Figure 2.

Further details of this model, including its practical applications and operational nuances, will be elaborated in the **WCIIP 2050** (Chapter 5). This Chapter will provide a comprehensive guide to leveraging the toolkit for fostering collaboration, driving innovation, and ensuring sustainable outcomes in infrastructure development.

Figure 2: Integrated Stakeholder Model Bridging Research and Practice Value[46]

5.4 Partnerships

The significance of partnerships is widely recognised and extensively documented, both globally and within South Africa. The NDP 2030 and the WCG's G4J Strategy emphasise the critical role of equitable public-private partnerships in fostering functional and sustainable societies. These strategies acknowledge the complementary strengths of the private and public sectors, being the private sector's capacity for innovation which aligns with the public sector's mandate of addressing the needs of all citizens, particularly vulnerable populations.

Building on this foundation, the WCG, through both its WCIF 2050 and G4J Strategy, advocates for proactive and diverse partnership models. These include financial and non-financial collaborations designed to unlock innovation, creativity and shared value. By embracing such partnerships, the WCG aims to drive inclusive economic growth while advancing broader development objectives.

The WCIF 2050 builds upon innovative partnership models that go beyond traditional transactional or monetary frameworks to genuinely share risks and rewards. While this principle is straightforward in theory, its implementation is complex due to the pervasive financialisation that dominates modern economies. The WCIF 2050 and WCIS 2050 acknowledge the critical role of finance in enabling infrastructure development, however, it emphasises the need for transformative partnership models that foster shared capacities and value creation.

For instance, the public sector carries a clear constitutional obligation to serve all citizens equitably, while the private sector operates with a primary focus on maximising shareholder value (profit). These priorities are often perceived as being fundamentally opposed, with the two sectors seen as occupying opposing ends of a spectrum. While this dichotomy persists for various reasons, current global socio-economic challenges demand a shift from this linear perspective toward a more integrated approach. This shift requires a deeper understanding of value chains, demonstrating that economic growth and profitability are intrinsically linked to inclusive development. Increased consumption, a key driver of growth and profits, can only emerge from the development of infrastructure that empowers all citizens to achieve their potential. This reveals the inherent connection between profit-driven goals and societal advancement. In essence, this approach calls for genuine synergies between public and private stakeholders, highlighting the importance of balance and mutual respect. It advocates for a collaborative framework that aligns profitability with inclusive growth and development goals, ensuring long-term benefits for all.

The WCIS 2050 promotes a central egalitarian partnership strategy, advocating for authentic and genuine partnerships that are thoughtfully and reflexively developed. This strategy emphasises the need to establish partnerships that are equitable, sustainable and aligned with shared goals, ensuring the following key considerations are addressed as a minimum:

1. **Addressing Inequitable Risk-Reward Relationships**

Risk allocation is central to Public-Private Partnerships (PPPs), with the private sector traditionally assuming risks appropriate to their expertise, such as project design, financing, construction or operation. However, classic PPP models often result in the transfer of unwanted or inappropriate risks to the public sector, contributing to systemic failures in critical infrastructure sectors like water, energy, rail and health. These imbalances have historically undermined the efficacy of PPPs, limiting their contribution to global infrastructure investment, which remains predominantly financed by public funds (accounting for over 90% of total investment)[41]. The WCIS 2050 calls for partnerships that avoid this imbalance, ensuring risk is shared equitably and aligned with sectoral capabilities.

2. **Reinterpreting Value-for-Money**

The concept of value-for-money is pivotal in understanding the rationale for establishing PPPs. Specifically, value-for-money refers to cost reductions achieved over a project's lifecycle by employing a PPP approach compared to traditional procurement methods[7]. To ensure the sustainability and fairness of partnerships, feasibility assessments must clearly demonstrate value-for-money relative to alternative approaches. This includes addressing the long-standing critique of PPPs, where risks are often socialised (borne by the public) while profits are privatised. The WCIS 2050 emphasises the importance of avoiding these practices and ensuring that partnerships deliver tangible benefits to all stakeholders.

3. **Establishing Legal and Regulatory Enabling Frameworks**

Effective and sustainable partnerships require robust legal and regulatory frameworks to govern their operation. Such frameworks must ensure accountability, transparency, and fairness, creating an enabling environment for partnerships to thrive[9]. These governance structures are essential to mitigate risks, resolve disputes, and align the objectives of all stakeholders, providing a solid foundation for long-term success.

By addressing these foundational elements, the WCIS 2050 seeks to foster partnerships that are effective in delivering infrastructure and also equitable in their approach, ensuring shared value creation and sustainable development.

Building on the WCIF 2050, the WCIS 2050 emphasises **Panarchic governance** and **Panoptic Principles** as critical mitigation measures to complement regulations governing partnerships, whether through PPPs or other SCM practices. These principles are considered central to addressing the WCG's articulated need for "infrastructure design, commission, and delivery with transversal governance and compliance".

This approach leverages **Panarchy**, a framework that emphasises adaptive, flexible and interconnected governance structures. It is underpinned by the **Panoptic Principles**, which advocate for holistic oversight, integration, and systems thinking. Together, they clarify that partnerships extend far beyond traditional investment or financial arrangements[51] (as detailed in Chapter 8, WCIF 2050) to encompass a broader spectrum of disciplines essential for sustainable infrastructure development.

Key elements incorporated into this broader perspective include (WCIF 2050, Chapter 10):

- **Innovation**: Encouraging creative and forward-thinking approaches to infrastructure challenges.
- **Risk Management**: Ensuring proactive identification, mitigation, and distribution of risks.
- **Technology**: Leveraging digital solutions and technological advancements to enhance infrastructure efficiency and effectiveness.
- **Systems Integration**: Emphasising the interconnectedness of various disciplines and stakeholders to achieve cohesive outcomes.

The incorporation of these principles ensures that partnerships are designed to align with the complexities of modern infrastructure needs. By adopting Panarchic governance and Panoptic Principles, the WCIS 2050 aims to foster partnerships that are financially equitable and also resilient, innovative, and aligned with the long-term development goals of the WCG. This holistic approach ensures that infrastructure governance remains adaptive, compliant and capable of addressing diverse challenges in a rapidly changing world.

In conclusion, the partnership approach outlined in the WCIF 2050 allows for differentiation to accommodate the unique contexts and needs of various stakeholders, without compromising the overarching goals of inclusive and sustainable development. Flexibility is essential to ensure that the WCIF 2050 and WCIS 2050 remain adaptive and relevant, addressing a wide range of possibilities while adhering to its foundational commitment to **transversal governance** and **Panoptic Principles**.

The WCIS 2050 acknowledges that effective partnerships require a nuanced understanding of stakeholder dynamics within the Western Cape's infrastructure ecosystem. Moving into the WCIIP 2050, the development of **ideal partnership standards** to guide collaborative practices across diverse stakeholder communities will be expanded upon. These standards will establish a foundation for ensuring that all partnerships are equitable, innovative, and aligned with the holistic vision of the WCIF 2050, fostering a resilient and inclusive infrastructure landscape.

5.5 Conclusion

The success of the WCIF 2050 and WCIS 2050 rests on its commitment to stakeholder engagement as a mechanism for driving meaningful, collaborative change. By embedding the Panoptic Principles, the WCIF 2050 and WCIS 2050 emphasise inclusivity, accessibility and equity across the infrastructure value chain. Recognising the challenges of engaging diverse stakeholders, such as power imbalances and the fluidity of roles, the application of multi-stakeholder platforms, systemic holism, and collaborative governance is essential. These mechanisms ensure that stakeholder engagement extends beyond mere compliance to foster trust, innovation, and collective benefit.

Equally central to the WCIF 2050 and WCIS 2050 is the emphasis on transformative partnerships that transcend traditional transactional models. Equitable risk-sharing, reinterpreted value-for-money metrics, and robust legal and regulatory frameworks to guide public-private partnerships (PPPs) are needed. By fostering partnerships that align with shared capacities and goals, the gap between public-sector mandates for inclusive development and private-sector innovation and profitability can be addressed. This collaborative approach ensures that infrastructure projects are both financially viable and socially impactful.

Looking forward, the WCIF 2050 and WCIS 2050 aim to set the gold standard for stakeholder engagement and partnership models within the Western Cape's infrastructure ecosystem. Prioritising transparency, adaptability, and inclusivity enables infrastructure projects to address immediate priorities while establishing a resilient, innovative, and equitable foundation for future generations. These efforts reinforce the WCG's vision of infrastructure as an ecosystem where all stakeholders thrive through shared responsibility and mutual success.

Chapter 6

Strategic and Transformative Context

6.1 Introduction

The core elements flowing from Chapter 5: Stakeholder Engagement and Partnerships mention the adoption of an ecosystem-based approach to the WCIF 2050, its strategy (WCIS 2050) and its implementation (WCIIP 2050) instruments. It recognises integrative efforts as core to all infrastructure stakeholders since it demands a truly collaborative effort from all in order to build trusted partnerships that are inclusive, collaborative, and ecologically sustainable, as engendered in the WCIF 2050's Panoptic Principles[26,28].

The WCIS 2050 values the unique contributions of each Department, Agency, or Organisation playing an active partnership role in shaping the WCG's infrastructure planning, implementing, maintaining and disposing of infrastructure assets. It requires the search for innovative partnership models that are able to offer distinct advantages by pooling and sharing resources and expertise from across sectors, to conceive and create infrastructure assets. These enhanced engagements, along with the types of partnerships and funding models, will require all parties across the public and private sectors to respect differences and to develop authentic, citizen-centric resolutions that reflect the priorities of collaboration, inclusivity, and resilience.

The WCIF 2050 expressly encircles guidance from improvement strategies across infrastructure literature that includes: Engineering and Built Environment (EBE), Public Policy, Economics, Social development, Value Chains, General Management, Systems Science, and Critical-Futures, all of which are tightly coupled to infrastructure design, delivery and maintenance. Since infrastructure encounters and traverses all these specialist areas, it must then assert strategies capable of integrating such diversity. By integrating these knowledge areas, the WCIS 2050 intends to enable all Western Cape stakeholders to collectively build a deeper understanding of integrated and advanced infrastructure conception, design, planning, delivery, maintenance and disposal. More directly, the WCIF 2050 and the WCIS 2050 are actively extending perspectives of the inter-locked nature of infrastructure value chains or extended value chains. This integrative manner of understanding and responding to infrastructure is the only strategic path to obtain integrative improvements across public and private sector institutions and recipient communities (especially Women, Youth, the Elderly and Persons with Disabilities), since activities of both sectors impact infrastructure outcomes, depicted in the triangulation of Figure 1.

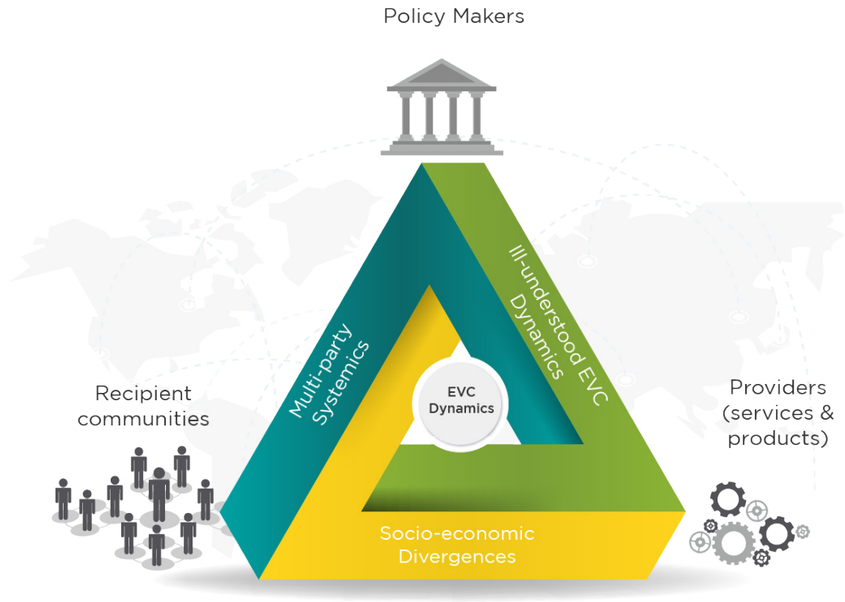


Figure 1: The effects of Public and Private sector dynamics on citizens

Figure 1 provides for a triangulated perspective on **Value Chains** and aims to illustrate how infrastructure delivery stems from a deeper systemic understanding of how Public-Private stakeholder activities are connected to and actively influence all citizens and recipient communities (especially Women, Youth, the Elderly and Persons with Disabilities).

6.2 Value Chains

Global Value Chains (GVCs) or Extended Value Chains (EVCs) are recent works that draw attention to deeper, often hidden, market dynamics. A key feature of the WCIF 2050 and WCIS 2050 is its recognition of these dynamics, which inherently influence value chains and necessitate clarity to ensure the success of interventions. Insights from the World Bank[1,3] reveal significant asymmetries in power relations across various market models and supplier networks[1], as depicted in Figure 2. These insights highlight the critical need for strategies that address such imbalances effectively.

For this reason, the WCIF 2050 calls for purposeful integrative thinking and strategic practices to drive sustained improvements across multiple time horizons leading to 2050. This approach reflects a critical-futures perspective on integrated thinking and action, guiding the necessary transformation across the infrastructure value chain. The strategic logic derived from value chains is grounded in the Western Cape infrastructure data patterns, highlighting challenges, strengths, weaknesses, opportunities, and threats (SWOT). Table 1 (depicted below) presents a current SWOT analysis (WCIF 2050, Version 2, February 2023), summarising findings specific to infrastructure in the Western Cape.

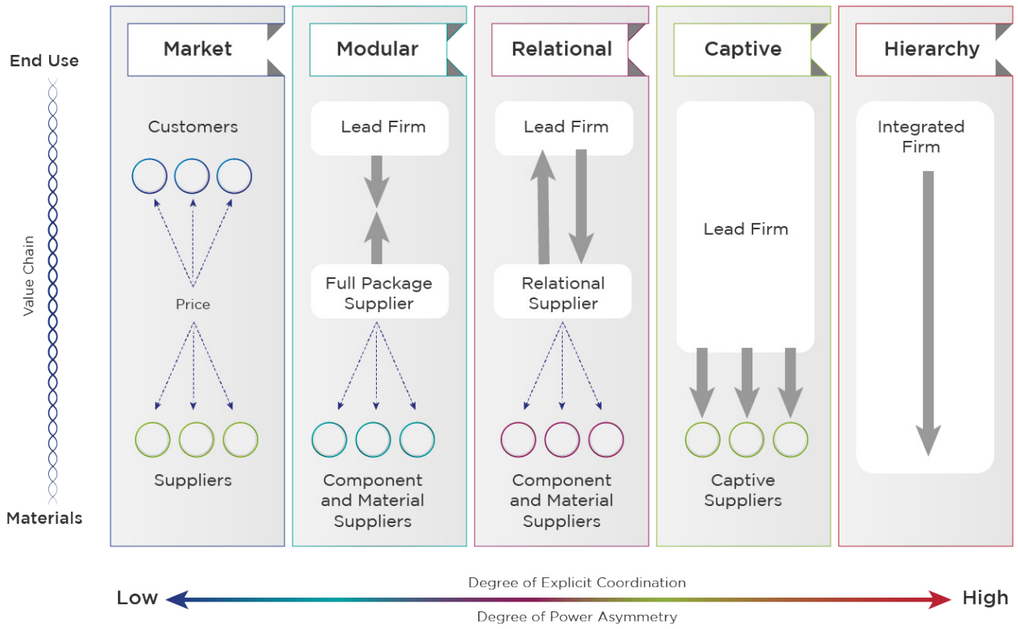


Figure 2: Value chain relations that impact infrastructure strategies[1]

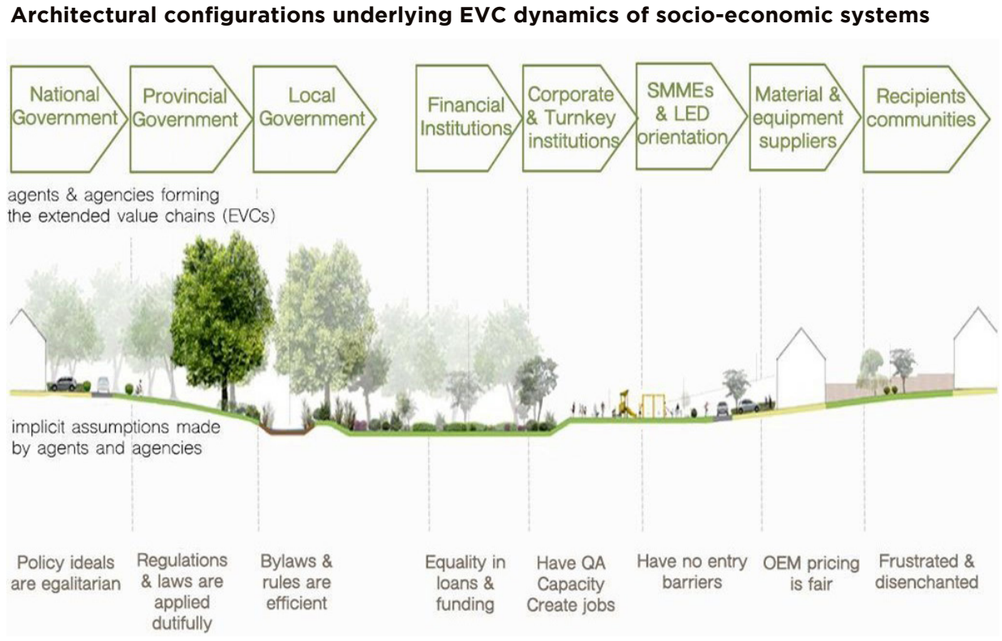


Figure 3: Extended Value Chain dynamics impacting "infrastructure ecosystems"

Practical strategies prioritise nurturing multi-actor linkages and interactions to facilitate knowledge exchange, capacity strengthening, joint learning, and continuous problem solving[8]. This approach encourages a broader and deeper perspective, enabling socio-economic development principles to empower SME participation in remunerative markets[3-8]. Clustering research insights emphasises the critical role of contractor, buyer, and consumer dynamics within value chains, drawing attention to their current lack of strong integration[9]. In other words, infrastructure is shaped by the relationships and interactions between agents and agencies, and failing to recognise these dynamics can lead to flawed explicit assumptions, as illustrated in Figure 3.

The illustration in Figure 3 highlights commonly misplaced assumptions, such as the belief that government policy ideals are egalitarian; that Regulations are strictly applied; that access to funding or financing is equitable; that large contractors possess sufficient capacity; that OEM pricing is inherently fair; and that recipient communities are satisfied with the outcomes.

Explicit strategic value of the WCIS 2050

Research clearly demonstrates that infrastructure programmes play a critical role in achieving objectives such[2-7] as providing a safety net for the needy; serving as adaptable and flexible tools for economic growth and development and acting as a tool for crisis relief during economic downturns, natural disasters or other disruptions[7]. These programmes also contribute to the delivery of essential community services (e.g., child development projects) and social infrastructure (e.g., schools, public sanitation and health centres), thereby stimulating human capital and fostering citizen centric outcomes[6,25].

Infrastructure is deeply connected with social systems, including organisations, towns, cities, and countries, all of which function as evolving or adaptive systems comprising of sub-systems like production systems, energy systems, transport systems, and ecosystems. These groupings are classified in the WCIF 2050 as "priority infrastructure sectors". Collectively these priority sectors work together to provide each organisation, town, city, or country with unique characteristics, including resilience.

Resilience refers to the ability of a system to regain viability (an equilibrium-like state) after being disturbed[11]. This concept applies across various domains such as policy, poverty alleviation, political frameworks, and business strategies[12]. Also, resilience systems have redundancy built into the design to safeguard from failures.

Efforts to integrate socio-ecological system needs have identified key features to build resilience, often referred to as adaptive capacities[13]. These include:

a. **Entropy**, which acknowledges the fundamental role of change and uncertainty in life.

b. **Diversity or Requisite Variety**, which supports regenerative functions and systems adaptability.

c. **Trans-disciplinarity**, emphasising the integration of diverse knowledge areas to enhance learning and practice.

d. **Empathetic design**, which is critical for the integration of socio-ecological needs, balancing poverty alleviation with ecological protection)[23-28].

These features serve as guiding principles for the WCIS 2050 amelioration targets to ensure the resilience of infrastructure value chains across the priority sectors. The strategic approach of the WCIS 2050 provides significant meta-value to all infrastructure stakeholders by addressing critical areas and features of the infrastructure value chain that are absent in traditional operational planning models. Equally important is its alignment with existing governing policies and protocols, facilitating compliance with frameworks such as the PFMA, MFMA, NSDF, PSDF, and MSDF. By recognising structural boundaries, the WCIS 2050 offers stakeholders explicit integrative value across the entire lifecycle of infrastructure, spanning its design, planning, implementation, maintenance, disposal and repurposing, thereby enhancing both sustainability and effectiveness.

In a way, the WCIS 2050 provides a robust platform capable of addressing both the diverse needs of stakeholders and the complexities of their interconnected roles within the infrastructure ecosystem of the Western Cape. The strategies outlined in the WCIS 2050 emphasise the importance of stakeholders across infrastructure ecosystems (cities, towns), recognising ecological thresholds and designing for gradual, well-paced reduction in resource consumption within urban landscapes[14]. This critical orientation in the WCIS 2050 urges all value chain actors to acknowledge and address the array of flawed practices, ranging from the over-domestication of natural systems by techno-infrastructure[14] to the socio-political system rules and regulations that shape the lives of citizens[3,14,22,23]. By doing so, the WCIS 2050 seeks to foster sustainable, inclusive, and adaptive infrastructure systems that balance human needs with ecological integrity.

6.3 Leverage Points

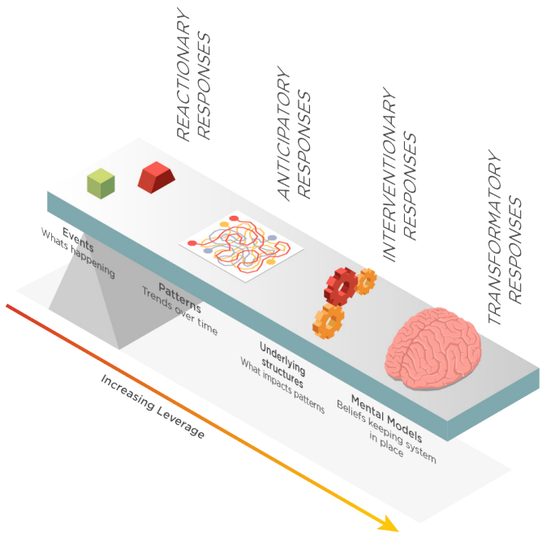


Figure 4: WCIS 2050's leverage points

Figure 4 illustrates the core **leverage points** critical for implementing the transformative responses required by the WCIS 2050 to achieve the greatest impact. These leverage points are contrasted with traditional responses, which often yield minimal leverage. The WCIS 2050 focuses on layers three and four in Figure 4, as they offer the most significant potential for systemic transformation, despite being the most challenging to address. However, the WCIS 2050 does not neglect layers one and two, as they are integral to the daily operations of stakeholder organisations. This underscores the principle that transforming infrastructure begins with transforming mindsets, as a change in thought leads to a change in action and practice.

Strategic upgrading trajectories offer valuable insights into industrial contexts[15], emphasising the importance of innovation[15,16]. These trajectories require deliberate and collaborative actions that reorder relationships among diverse actors while fostering continuous learning and adaptation[15,17,23].

Multi-stakeholder processes, such as Global Value Chains (GVCs) or Extended Value Chains (EVCs), serve as platforms for diverse agents to interact, articulate their respective demands, experiment, co-learn, foster collective action, coordinate, build capacities, and enhance business linkages[15,18,20]. These processes inherently involve power dynamics, such as equitable sharing of benefits[15,18,20], and are influenced by cultural, financial, and relational factors[19,20]. Addressing these dynamics necessitates strategic actions to shape participation and inclusion, particularly for marginalised citizens and groups[3,20].

Through these interactions, multi-stakeholder processes can give rise to proto-institutions[21,22], this means mechanisms that facilitate SME integration into value chains[14-16]. When these proto-institutions become embedded within systems, they can drive systemic shifts, enabling sustainable SME market integration and fostering a more equitable and inclusive infrastructure ecosystem[14-22].

6.4 Infrastructure SWOT Analysis

Strengths	Weaknesses
▸ Infrastructure is identified as a key cornerstone of growth in the 2050 National Infrastructure Plan. ▸ Infrastructure is prioritised at all three levels of government, with specific funding streams and focus by Infrastructure South Africa. ▸ Infrastructure is identified as a key component in the Western Cape Government's Recovery Plan. ▸ The Western Cape Government is giving priority attention to infrastructure, with the extension of infrastructure growth to include social, energy and water, economic, technology and ecological infrastructure as an integrated approach. ▸ Government remains a key partner to the Private Sector.	▸ No singularity in vision or purpose across all the infrastructure role-players. ▸ Fragmented approach to infrastructure planning and development. ▸ Fragmented approach to infrastructure development in communities (e.g., housing developments being built with limited or no planning of school infrastructure considered). ▸ Deteriorating public sector infrastructure needing maintenance plans to be expedited. ▸ Bureaucratic processes impeding infrastructure project implementation. ▸ Funding agencies mostly have experience with national or local government levels. ▸ Lack of technical (engineering and supply chain) competencies across the spheres of government, especially national and local government. ▸ Conservative, sometimes archaic approaches to infrastructure planning and design ('safe business-as-usual design prevents out-of-the-box thinking jump-starting a new economic phase'). ▸ Unethical behaviour of government officials, including corruption in supply chain processes. ▸ Inefficiencies in unit costings.
Opportunities	**Threats**
▸ Infrastructure development and growth is a priority for South Africa and Africa. ▸ Infrastructure is a key driver of socio-economic growth and a large contributor to employment. ▸ Improve infrastructure planning and coordination between the Western Cape Government and the Municipalities in the Western Cape. ▸ Medium to long-term integrated spatial planning needed for the Western Cape. ▸ Reposition Infrastructure to greener and more sustainable infrastructure buildings. ▸ Climate change funding and global needs allow for rapid uptake of new technologies and adaptation. ▸ The Climate Change Economic Costs and Opportunities Modelling reflects significant opportunity if we make the right choices. ▸ Substantial research to support infrastructure design that leads to broad social benefits. ▸ Partnerships with Higher Education Institutions.	▸ Disruptions to global supply chains as a result of variants to the pandemic and the Russia-Ukraine war. ▸ Slow economic growth and high levels of unemployment. ▸ Low investor confidence in South Africa, as international companies prioritise outward investment. ▸ High and increasing inflation and higher commodity prices. ▸ Continuing loadshedding and high electricity prices. ▸ High government debt and reduced share of national fiscus. ▸ Policy uncertainty on land expropriation and restitution. ▸ Failure of critical infrastructure systems sitting at various levels of government departments and government entities. ▸ Failure of industry, especially grade 9 and small-scale contractors. ▸ Level 1 maintenance not being properly executed. ▸ Vandalism and theft of infrastructure and the negative impact of the construction mafia. ▸ Infrastructure space is politicised. ▸ Cost transferred to developers (making developments unaffordable) and development contributions not ploughed back. ▸ Non-payment or delayed payments of contractors by government departments and entities. ▸ Global drive towards net-zero vs the SA reality. ▸ Climate change impacting on medium to long-term planning. ▸ Climate change impacting on current infrastructure (e.g., against hazards such as floods and wildfire) as observed in parts of the province. ▸ Waste infrastructure crises could lead to environmental, health and economic consequences, including landfill overflows, pollution and missed opportunities for circular economy growth. ▸ Emergence of informal settlements arising from the migration of people at risk to climate change (climate refugees).

Table 1: Western Cape Infrastructure SWOT Analysis

Summary of SWOT matrix

The SWOT analysis highlights that infrastructure involves a diverse range of stakeholders across multiple sectors, each with unique and concurrent demands. This analysis underscores the inherently networked nature of infrastructure value chains, which the WCIS 2050 seeks to integrate and harmonise within the context of South Africa's reformative policy ideals. The findings emphasise that value chain interconnections are central to the interactions between agents and agencies within the Western Cape's infrastructure ecosystem.

This perspective deepens the socio-economic understanding of the connections required to foster institutional robustness, innovation and compliance[1]. It also identifies global infrastructure themes that propose key enhancements, such as[2,3]:

- Designing more robust programmes that encompass the entire lifecycle from concept to maintenance.
- Establishing transversal governance protocols that are transparent, accountable, and insightful, effectively addressing errors, fraud, and corruption at various levels across Global Value Chains (GVCs) and Extended Value Chains (EVCs).

The WCIS 2050 emphasises the importance of recognising the diversity of agents and actors engaged in the spectrum of production-to-consumption activities and understanding their impacts on both value creation and market linkages[7-10]. By adopting strategies informed by value chain insights, the WCIS 2050 aims to drive inclusivity and innovation, aligning with the WCG's growth objectives and as outlined in the NDP, NIP and G4J.

6.5 Opportunities for infrastructure improvement linked to the SWOT analysis

Infrastructure is a globally known and common form of government intervention to stimulate socio-economic activity, despite varied difficulties in practice, like[1,3]: Low wages; Leakage; Corruption; Rationing; Mismanagement; Design and integration issues across multiple stakeholders; and Policy ideals not flowing into design and implementation, etc. These challenges[1-4] and features are stated in the WCIF 2050 and are intended to be addressed in the WCIS 2050 and WCIIP 2050. The improvement strategies in the WCIF 2050 therefore cover both technical and general management skills across the public and private sectors.

There is a need to see "wider and deeper into value chains", which will enable thought leadership to navigate the infrastructure ecosystem in terms of its networked nature and supply chain relations that need to be anticipated, i.e., algedonic alerts[2] (i.e. early-warning systems). This speaks to improvement strategies and opportunities that include less understood advancements in designing more effective infrastructure works[5], especially since they are central to job creation. These value-add areas support the movement toward inclusivity of workers more directly, also envisaged in South Africa's constitutional and labour laws seeking to eliminate socio-economic disparities[6]. Interestingly, Eastern infrastructure was built after – rather than before – many years of economic growth[7]. Its success relied on features such as[7]: promotion incentives for officials; availability of state finance; and use of state-owned infrastructure firms. Also, its infrastructure investments were planned across a few clusters to deliver foreign exchange and investment[7] (e.g., agricultural development and alleviation of hunger). These infrastructure patterns are important to the WCG and its WCIF 2050 since local infrastructure programming is required to be innovative due to fiscal constraints and dated planning models that exclude value chain challenges[2].

Also insightful are views suggesting "green infrastructure" have little to do with ecological factors, and more to do with marketing and profit-taking[8], which requires acknowledgement and assurance for better infrastructure planning and evaluation. The question of whether green infrastructure is driven by ecological goals (to preserve the environment) or economic objectives (profitability and competitive advantage)[8] becomes less relevant, as economic and ecological perspectives often stem from fundamentally distinct paradigms that operate independently of one another[10,11]. A way forward lies in fostering integrative approaches that bridge these paradigms, such as circular economy models or regenerative practices, which align ecological preservation with long-term economic resilience.

Infrastructure works can positively aid communities to re-learn the vitality of Biophilia, i.e., our innate biological desire to connect with nature[11] as it is allied to human wellbeing and survival. It explains the human need to associate with biological or life processes[47], which ensures that we live within our natural boundaries[12].

Practically, the WCIS 2050 needs to build awareness and reward stakeholder groups or agencies in its value chains, so as to co-develop solutions that promote empathetic exploitation models that inherently reduces carbon footprints necessary to re-connect to the generative powers of the living earth[10].

The WCIF 2050, its strategy (WCIS 2050), and its implementation (WCIIP 2050) must therefore offer empathetic designs and tools (i.e., methods and models like rich pictures, and Gigamaps) that are indispensable for their value in organising and blending vast amounts of information, able to depict systemic patterns and connections that are usually hidden. In this way, the WCIF 2050 offers infrastructure stakeholders a constructive tool for critique, stressing reflexivity needed to rebuild trust between stakeholders. Reflexive-action refers to embedding science into a variety of practices, like transdisciplinary mapping of Process blueprints, Journey maps, Synthesis maps, and Gigamaps used when dealing with complex problems[13].

In summary, the WCIF 2050 is a systemic and transformative framework designed to transcend traditional linear models by embracing interconnections of a networked society. It equips stakeholders with a dynamic and fluid approach to envision and shape the future evolution of these systems, using maps as tools for exploration and development[13]. For example, synthesis maps integrate research, systems expertise, and design into engaging visual narratives that enhance communication and enable informed decision-making[70]. Similarly, systemic maps promote continuous learning by bridging the gap between expert insights and public understanding, empowering individuals to deepen their understanding, drive self-development, and actively participate in meaningful systemic change[2].

The WCIF 2050 must adopt taming strategies that address historical shortcomings while tackling pressing challenges such as unemployment, socio-economic inequality, and ecological restoration. This infrastructure reality spans a wide array of stakeholders, all of whom can benefit from the WCIF 2050's systemic tools, like visioning, planning, discourse-building, and coalition-building[14]. These tools are integral to taming strategies, enabling stakeholders to navigate interconnected infrastructure challenges effectively[2,14]. By leveraging these approaches, planners gain deeper insights into the complexities of socio-ecological dynamics, paving the way for more informed and holistic solutions.

Action and implementation exploration

The WCIF 2050 provides valuable insights for infrastructure stakeholders, derived from a diverse range of data sources. This underscores the importance of the WCIS 2050 offering reflexive planning that drives incremental change through "innovation bundles"[33], which are synergistic combinations of technological, organisational, and institutional innovations underpinned by reflexive learning[3,33]. A critical demand of the WCIF 2050 is the inclusion of marginalised communities in the innovation process itself[33], involving their active participation in the design, development, production, and delivery of infrastructure solutions that meet their specific needs. By embracing this inclusivity, infrastructure programmes can address resource constraints through enhanced innovation capacities[35] across stakeholders, practices, routines, institutions, and policies. This approach ensures that collective knowledge is effectively harnessed to deliver impactful and equitable solutions[60].

6.6 Problem Statement

Deteriorating, insufficient and inappropriate infrastructure impacting negatively on the lives of citizens in the Western Cape and impeding economic growth.

6.7 Theory of Change

An overarching blueprint for achieving the desired transformation, based on the identified challenges, the Theory of Change serves as the foundation for aligning strategies and actions toward a common vision. It outlines the critical pathways required to bridge gaps, address systemic weaknesses, and leverage identified strengths within the infrastructure ecosystem. By clearly defining the causal links between interventions and desired outcomes, it ensures that stakeholders can collaboratively focus on high-impact areas that drive meaningful change. This approach sets a clear direction and also integrates adaptability, allowing for iterative improvements in response to emerging challenges and opportunities. Ultimately, the Theory of Change fosters accountability and coherence across multi-actor processes, ensuring that progress remains aligned with the stated outcomes and impact.

The WCIF 2050 presents a Theory of Change that addresses critical challenges in infrastructure development, including unequal access, underinvestment, deteriorating infrastructure, and fragmented planning. This Theory of Change outlines a transformative pathway, prioritising equitable and accessible infrastructure delivery, integrated ecosystems, and citizen co-creation to ensure context-appropriate solutions that enhance community wellbeing and economic inclusion. By sharpening infrastructure as a tool through innovation, strengthened technical capabilities, and lifecycle management, the approach seeks to address maintenance backlogs and improve efficiency. Additionally, the WCIF 2050 envisions mobilising diverse funding models, streamlining investment processes, and fostering holistic public sector planning to create a resilient and sustainable infrastructure ecosystem. This Theory of Change positions the Western Cape to achieve its infrastructure goals and enable inclusive and sustainable growth.

WCIF 2050 Theory of Change Challenge Statements:

1. Unequal access to appropriate and enabling infrastructure that delivers quality service.
2. Lack of innovation to address deteriorating and inadequate infrastructure, maintenance and backlogs (new and existing infrastructure).
3. Underinvestment, insufficient budget and lack of innovative funding models for infrastructure development.
4. Lack of holistic integrated public sector planning towards delivery and performance of infrastructure in the Western Cape.

WCIF 2050 CHALLENGE STATEMENT	WCIF 2050 STRATEGIC RESPONSES	WCIF 2050 ACTIONS NEEDED
Challenge Statement1: Unequal access to appropriate and enabling infrastructure that delivers quality service. **Change Strategy needed:** **ACCESS TO QUALITY INFRASTRUCTURE**	**1a. Inclusive Planning and Citizen Co-Creation**	▸ Prioritisation model is used for infrastructure delivery. ▸ Western Cape delivers infrastructure that is context appropriate. ▸ Increase co-creation with citizens to develop appropriate infrastructure to address citizen needs. ▸ Flexible infrastructure delivery models are used.
	1b. Equitable and Accessible Infrastructure Delivery	▸ Infrastructure delivery is equitable and fairly prioritised. ▸ Infrastructure design and operation is explicitly responsive to the needs of Women, Youth, the Elderly and Persons with Disabilities. ▸ Increased accessibility to appropriate, safe and quality Infrastructure. ▸ Improved access to physical and digital infrastructure.
	1c. Integrated and Connected Infrastructure Ecosystem	▸ Appropriate interconnections exist in the infrastructure ecosystem that facilitates increased access and use. ▸ Infrastructure enables the provision of quality services to citizens. ▸ Reduced travel time and distance to accessing infrastructure. ▸ Increased availability of office access for alternative uses.
	1d. Promoting Equity, Economic Inclusion, and Sustainable Growth	▸ Increased/equal access to infrastructure for all citizens regardless of geography and socio-economic status. ▸ Communities are integrated into the economy. ▸ Citizens use infrastructure to participate in the economy ▸ Enhanced use of infrastructure to stimulate smart, inclusive, and sustainable growth.
	1e. Fostering Community WellBeing and Trust	▸ Improved quality of life for Western Cape citizens. ▸ Trust between the province and citizens is strengthened. ▸ Increased social cohesion.
	1f. G4J Interconnection	▸ Integrated development is smart, contributes towards Just Transition and address spatial inequalities. ▸ Infrastructure enables communities to better participate in the economy.

Table 2: TOC Challenge Statement 1 – Unequal access to appropriate and enabling infrastructure that delivers quality service.

WCIF 2050 CHALLENGE STATEMENTS	WCIF 2050 STRATEGIC RESPONSES	WCIF 2050 ACTIONS NEEDED
Challenge Statement 2: Lack of innovation to address deteriorating & inadequate infrastructure, maintenance & backlogs (new and existing infrastructure) **Change Strategy needed:** **SHARPEN INFRASTRUCTURE AS A TOOL**	**2a. Driving Innovation and Data-Driven Solutions**	▸ Innovative solutions are adopted and utilised to infrastructure and service delivery. ▸ Increased availability and accessibility to quality data. ▸ Revised norms and standards that are in step with future needs. ▸ Increased investment in R&D towards alternative infrastructure solutions. ▸ Flexible infrastructure delivery models are used.
	2b. Strengthening Technical and Operational Capabilities	▸ Strong technical capabilities are developed through strengthened engineering, project management and supply chain capabilities. ▸ Decentralised remediation addresses maintenance and backlogs.
	2c. Optimising Asset Management and Life-Cycle Planning	▸ Assets are catalogued to identify models needed for improvement. ▸ A balanced Western Cape infrastructure portfolio caters to present and future (life-cycle management).
	2d. Leveraging Assets for Enhanced Efficiency	▸ Identified opportunities are used to leverage the sweating of assets for greater efficiency gains. ▸ Optimise approaches to reduce risk to infrastructure and service delivery with regard to designing in redundancy/failsafe and interoperability for risk reduction and disaster prevention.
	2e. G4J Interconnection	▸ Improved delivery, execution & maintenance of infrastructure. ▸ Government improves economic competitiveness, supports growth opportunities & reduces maintenance costs.

Table 3: TOC Challenge Statement 2 – Lack of innovation to address deteriorating and inadequate infrastructure, maintenance and backlogs (new and existing infrastructure).

WCIF 2050 CHALLENGE STATEMENTS	WCIF 2050 STRATEGIC RESPONSES	WCIF 2050 ACTIONS NEEDED
Challenge Statement3: Underinvestment, insufficient budget and lack of innovative funding models for infrastructure development. **Change Strategy needed:** **FUNDING FOR INFRASTRUCTURE**	**3a. Streamlining Processes for Effective Investment**	▸ Reduced red tape to improve ease of doing business. ▸ Enhance the use of strategic environmental planning tools to reduce the needs for project level ad hoc interventions. ▸ Flexible supply chain management. ▸ A prioritisation model is used to inform investment in infrastructure. ▸ Public Financial Management skills exist within the public sector.
	3b. Creating an Enabling Investment Environment	▸ Infrastructure delivery is equitable & fairly prioritised. ▸ Increased accessibility to appropriate, safe and quality Infrastructure. ▸ Improved access to physical and digital infrastructure.
	3c. Integrated and Connected Infrastructure Ecosystem	▸ Ease of access to investment opportunities. ▸ There is an enabling environment that exists to implement alternative and innovative funding solutions. ▸ Equitable incentives are used to stimulate investment. ▸ Budget allocations are based on the achievement of mission-oriented goals. ▸ Critical data science and data analytic skills are used to inform infrastructure project planning and implementation.
	3d. Mobilising Regional and Private Financing	▸ Regional financial instruments are mobilised for emerging priorities of the WCIF 2050 and the WCIS 2050. ▸ Borrowing policies are leveraged to source corporate/project finance from the private sector. ▸ Enhanced private and public sector collaboration that facilitates inclusive economic growth. ▸ Public sector funding is spent appropriately on infrastructure projects.
	3e. Driving Investment and Private Sector Advocacy	▸ Increased investment towards infrastructure projects. ▸ Private sector advocates for funding got projects.
	3f. G4J Interconnection	▸ Pipeline of infrastructure projects are realised, obtain financial approval & implemented across the Western Cape.

Table 4: TOC Challenge Statement 3 – Underinvestment, insufficient budget and lack of innovative funding models for infrastructure development.

WCIF 2050 CHALLENGE STATEMENTS	WCIF 2050 STRATEGIC RESPONSES	WCIF 2050 ACTIONS NEEDED
Challenge Statement 4: Lack of holistic integrated public sector planning towards delivery and performance of infrastructure in the Western Cape. **Change Strategy needed:** **HOLISTIC PUBLIC SECTOR PLANNING**	**4a. Building Expertise and Inclusive Planning**	▸ Expert empathetic public sector planners are developed. ▸ Inclusive planning channels that allow for co-creating infrastructure solutions with citizens. ▸ Enable inclusive and dignified planning and ensure responsiveness to WYPD (Women, Youth, Persons with Disabilities) needs. ▸ Infrastructure planning considers critical thinking, futures, systemic, innovative methods/tools. ▸ Increased availability and accessibility to quality data. ▸ Data intelligence is strengthened at national and provincial levels.
	4b. Strengthening Collaboration and Decision-Making	▸ Strengthened partnerships and collaborative planning with local government. ▸ Blockages and systematic red tape are eliminated for local government and private sector participation. ▸ Increased use of predictive data analytics that informs decision-making. ▸ Feedback is used for reflective actions to inform course corrections.
	4c. Advancing Holistic and Sustainable Planning	▸ Enhanced, sustainable, and holistic planning that includes the whole of society. ▸ Enable and operationalise strategic provincial Biodiversity Offsets and associated mechanisms to reduce delays in environmental processes. ▸ Ensure Net-Zero Carbon aspirations inform all planning and design choices.
	4d. G4J Interconnection	▸ Coordinated and integrated infrastructure planning across spheres of government. ▸ Officials are enabled to be innovative, supportive & responsive to economic opportunities. ▸ Collaboration models are leveraged for smart, just transition infrastructure.

Table 5: TOC Challenge Statement 4 – Lack of holistic integrated public sector planning towards delivery and performance of infrastructure in the WC.

6.8 Infrastructure Challenges and Strategic Thrusts

As outlined in the problem statement and previous sections, the WCIS 2050's transformative needs encompass the entire infrastructure value chain[1,22,23]. To address these, the WCIS 2050 is designed to target critical **leverage points** over **multiple time horizons**, ensuring a purposeful approach and sustained progress. Figure 5 illustrates the threats identified in the SWOT analysis and outlines their potential mitigation strategies across the three planning horizons.

This visualisation highlights the WCIS 2050's strategic orientation to address meta-level needs, facilitating consistency in compliance and reducing costs. These efforts focus on:

a. Empathetic design to prioritise human-centred and socio-ecological considerations.

b. Integrative planning that aligns diverse stakeholder objectives and resources.

c. Coordinated delivery to streamline infrastructure implementation processes.

d. Strategic feedback measurement to enable reflexive actions and adjustments within and across planning horizons.

The following themes, reflecting the current weaknesses in the infrastructure ecosystem, align with the Theory of Change and can be grouped into strategic thrusts. These thrusts require a focused, targeted approach to address systemic gaps and challenges while guiding the implementation of the WCIS 2050 towards its transformative vision:

Strategic Thrust 1: Capacity Gaps and Coordination

Infrastructure projects face significant challenges due to capacity gaps across both the public and private sectors. In the public sector, compliance protocols are often seen as causing delays in design, planning, and approvals. On the other hand, the private sector's faster pace is often driven by a focus on efficiency and expediency and can sometimes have unforeseen outcomes. The SWOT analysis highlights the need for Horizon-1 strategies to prioritise high-leverage skills, capacities and activities while setting the foundation for further improvements in the medium- and long-term horizons.

Strategic Thrust 2: Funding and Partnerships

The volume of both new infrastructure development and the maintenance of existing infrastructure requires great levels of investment and funding. Addressing this global reality necessitates the creation of innovative partnership models that promote collaboration between the public and private sectors. The WCIS 2050's focus is on

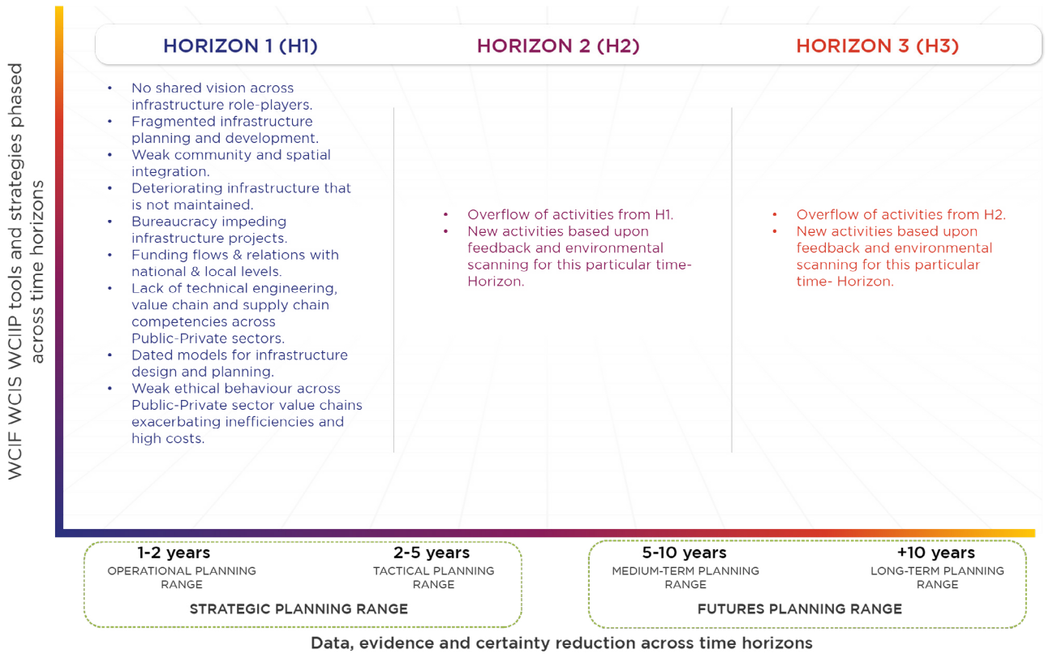


Figure 5: WCIS 2050 leverage points planned across multiple time horizons

driving equitable, win-win agreements that enable profit-taking, while benefiting local communities and safeguarding the environment.

Strategic Thrust 3: Compliance with Regulatory and Policy Instruments

Infrastructure spans numerous specialist areas, departments, and policy instruments, all of which require adherence to compliance frameworks. These frameworks (e.g., NDP, DPME, NT's FMPA and MFMA, NSDF, PSDF, MSDF, NLTF, PLTF, NDC, CCA 2024, JTF, WCCCRS, WCEIIF, etc.) are well-intentioned and designed to safeguard both citizens and the environment. The WCIS 2050 recognises that a meta-model integrating the diverse needs of the policy and regulatory landscape is essential to add value across the infrastructure value chain in the Western Cape. A key taming strategy is therefore the harmonisation of the WCIF 2050 that must be supported by the WCIS 2050's efforts to match the meta-needs and not replicate what exists.

Strategic Thrust 4: Empathetic and Critical-Design Orientations

The multiplicity of needs from different infrastructure stakeholders, coupled with their short-term focus frequently obstruct the adoption of longer-term strategic imperatives. For instance, private entities often prioritise immediate survival over compliance, viewing approvals as costly and unnecessary, while public sector delivery delays are tied to institutional constraints. These issues reveal a lack of empathy between parties and insufficient critical reflection on their roles within the infrastructure value chain. To address these challenges, the WCIS 2050 must develop tools and techniques that promote empathetic and critical design approaches among stakeholders. This will foster long-term trust, encourage innovation, and drive meaningful transformation.

Strategic Thrust 5: Innovation, Rare skills, and Emerging Competencies

The scale of innovation envisioned by the WCIF 2050 spans the entire infrastructure value chain and will require the development of new competencies, cutting-edge tools, and adaptive methodologies. These capabilities will be essential for stakeholders to navigate the evolving landscape with consistency, transparency, and efficiency. The WCIS 2050's remediation efforts should explicitly detail innovation threads, focusing on areas such as digital transformation, green infrastructure solutions, and advanced materials engineering. For instance, innovations in material technology, AI-driven predictive maintenance, and renewable energy integration could significantly enhance infrastructure planning and delivery.

Additionally, the WCIS 2050 should prioritise the cultivation of rare skills, including systems thinking, climate-resilient design, and stakeholder engagement expertise. Emerging competency development programmes should integrate interdisciplinary training that combines technical knowledge with socio-ecological considerations, such as sustainable urban planning and circular economy principles. Training initiatives could leverage partnerships with academic institutions, industry leaders, and global innovation networks to ensure cutting-edge practices are embedded within the infrastructure ecosystem.

This comprehensive and forward-looking approach will ensure that the WCIS 2050 not only addresses systemic challenges but also fosters a culture of collaboration, continuous innovation, and resilience across all levels of the infrastructure value chain.

6.9 Logic Model Framework

The **WCIF 2050's Impact Statement** defines its transformative aim: A flexible, innovative, and inclusive framework for collaborative infrastructure planning and asset management that informs and aligns sound decision-making and serves the needs of citizens, communities, enterprises, and the natural environment. This impact is a critical step toward realising the **Vision**: The WCIF 2050 will enable infrastructure-led growth and investment for the Western Cape that will benefit the communities we serve.

To achieve this vision, the **Logic Model Framework** is employed as a structured "Results Chain", systematically linking resources, activities, and outputs to the desired outcomes and impact[33]. It demonstrates a structured approach to programme planning, project planning and evaluation. Each step is connected to "if-then" logic, where the achievement of one stage enables progression to the next. It seeks to operationalise the Theory of Change by providing a clear roadmap that links resource investments to measurable outcomes and long-term goals.

The **Logic Model Framework** is critical for ensuring accountability, planning, and evaluation at every stage, aligning activities with the desired outcomes. The WCIS 2050 adopts and operationalises the same outcomes identified in the **Provincial Strategic Plan's (PSP)** transversal focus area for Spatial Transformation, Infrastructure and Mobility.

Impact Statement for Spatial Transformation, Infrastructure and Mobility	Coordinated spatial planning, infrastructure, and mobility increase equitable value and access to economic opportunities, public spaces, services, and recreational facilities.
Focus Area Outcome	A more resilient and spatially transformed Western Cape creates vibrant, liveable environments with improved access to opportunities, mobility, social and recreation infrastructure.

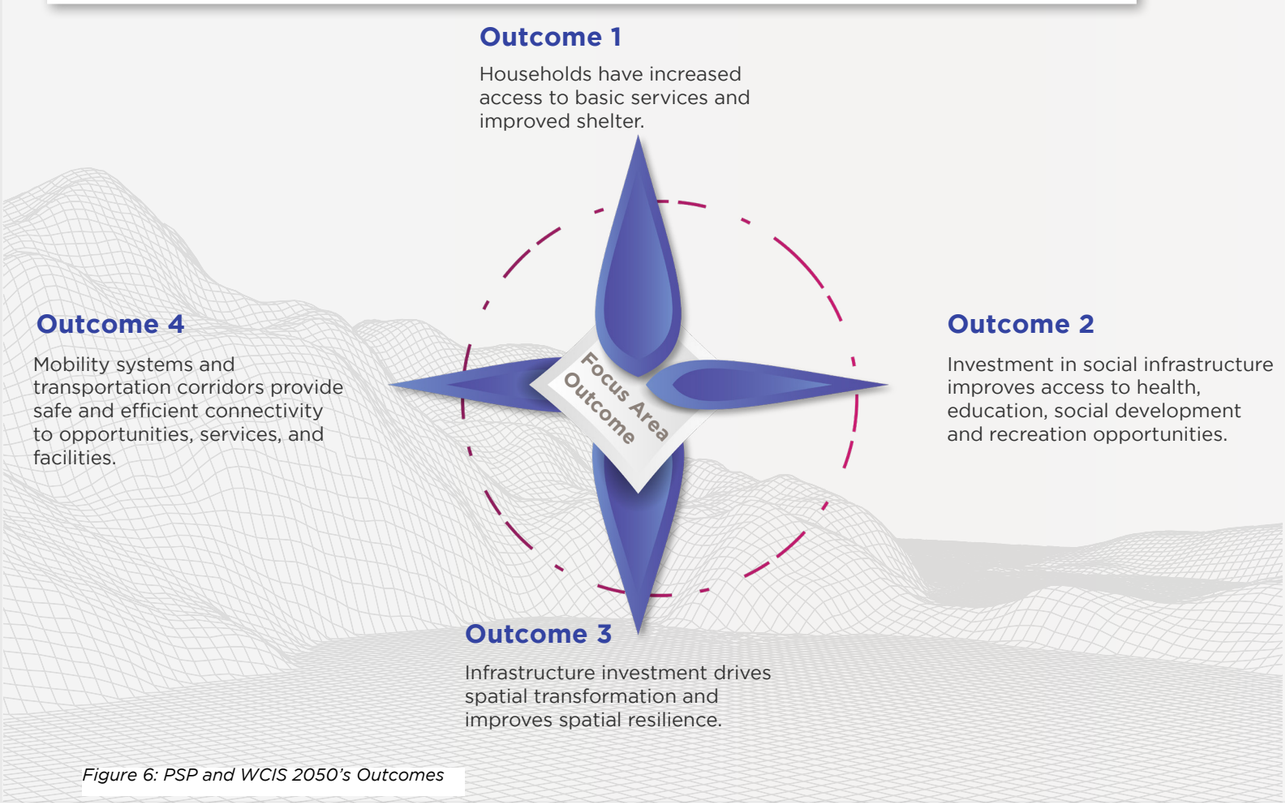


Figure 6: PSP and WCIS 2050's Outcomes

By integrating these outcomes into its strategic framework, the WCIS 2050 reinforces a unified vision for a more resilient, inclusive, and sustainable Western Cape.

Translating the Theory of Change into targets and indicators

The prescribed strategic planning cycle in the public sector[29-32] has been consolidated into a visual map (see Table 6). The purpose is to reveal the planning compliances and how they enable and support each other. The WCIF 2050, its strategy (WCIS 2050) and implementation (WCIIP 2050) adopt this framing so as to offer value to infrastructure stakeholders regarding visualisation, integration, coordination and delivery.

Table 6 outlines the strategic planning cycle used in public sector planning, breaking down a five-year period into annual cycles. Each cycle progresses through several stages: **Inputs, Activities, Outputs, Outcomes, and Impact.** This structured approach ensures alignment with performance planning and compliance, contributing to the preparation of key documents such as the Annual Performance Plan (APP), Annual Operational Plan (AOP), and Annual Report (AR). These documents also inform the Service Delivery Improvement Plan (SDIP).

This process is vital for achieving structured, measurable, and sustainable progress within public sector projects and programmes. Key features include:

- The strategic planning cycle emphasises **continuous alignment** between annual activities and long-term objectives.
- It provides clear **reporting mechanisms** for each stage, ensuring compliance with public sector requirements and facilitating accountability.
- The approach integrates **SMART principles** to enhance the effectiveness and measurability of outputs, outcomes, and impacts.
- It supports iterative **service delivery improvement** through systematic documentation and evaluation.

Table 7 reflects the WCIF 2050, WCIS 2050 and WCIIP 2050's logic model framework for infrastructure sector planning and delivery. All **transversal inputs, activities and outputs lead to achieving the Outcomes** of:

- Outcome 1: Households have increased access to basic services and improved shelter.
- Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities.
- Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience.
- Outcome 4: Mobility systems and transportation corridors provide safe and efficient connectivity to opportunities, services, and facilities.

These four Outcomes are framed under the Focus Area Outcome: A more resilient and spatially transformed Western Cape creates vibrant, liveable environments with improved access to opportunities, mobility, social and recreation infrastructure. These outcomes lead to achieving the PSP and the WCIF 2050's Impact Statements.

Table 7 illustrates the logic model framework underlying the WCIF 2050, WCIS 2050, and WCIIP 2050, designed to guide strategic infrastructure sector planning and delivery. This framework aligns transversal inputs, activities, and outputs with a series of outcomes that collectively contribute to the Western Cape Government's broader infrastructure goals. The model emphasises integrated planning and implementation to achieve transformative results in both the short-, medium- and long-term.

Public sector Logic Model Framework[29-32] (Theory of Change – Results Chain)

	IF INPUTS	THEN IF ACTIVITIES	THEN IF OUTPUTS	THEN IF OUTCOMES	THEN IMPACT
Each Strategic planning cycle covers a 5-year period: each period is decomposed into individual years, all having: 1. **Annual Performance Plan (APP)** 2. **Annual Operational Plan (AOP)** 3. **Annual Report (AR) all being part of Public sector planning compliance** **These documents are also informants to the service delivery improvement plan (SDIP).**	**WHAT WE INVEST:** The financial, human, and material resources that are necessary for the activities to take place and the outputs to be produced.	**WHAT WE DO:** The activities are the necessary tasks undertaken by personnel to transform the inputs to outputs.	**WHAT WE ACHIEVE:** Outputs are the products and services produced. It is the results of a project. The outputs are SMART (specific, measurable, achievable, realistic and time-bound) and must be precisely and verifiably defined.	**WHAT CHANGES**: Outcomes (first step in an impact evaluation) are the effects of outputs. An outcome is the benefit of whatever it is that you want to do (shift, change, movement, benefit). What is the changed situation you want to achieve by the end of your project? Outcomes must be SMART.	**THE CONSEQUENCES:** The consequences of the programmes/ projects. Impacts tend to be longer-term and so may be equated with goals. Impact indicator: Expression or indication of impact. Evidence that the impact has been achieved. Impact must be SMART.
	EXAMPLES: Staff, Time, Money, Research base, Materials, Equipment, Technology, Partners.	**EXAMPLES:** Deliver services, Develop products and resources, Education and training, Network with others, Build partnerships, Advocacy, Facilitation, Work with businesses.	**EXAMPLES:** Number of businesses reached; Number of people trained; Number and type of services delivered; Number of projects delivered; Number of research projects undertaken.	**CHANGES IN:** Knowledge, Attitude, Skills, Behaviour, Decision-making, Policies, Social action.	**CHANGES IN:** Conditions, Economic, Social (wellbeing), Health, Civic, Environmental.
	WHERE INFORMATION IS REPORTED: Both Inputs and activities outlined in the annual operational plan (**AOP**).	**WHERE INFORMATION IS REPORTED:** Both Inputs and activities outlined in the annual operational plan (**AOP**).	**WHERE INFORMATION IS REPORTED:** The outputs and its performance indicators and targets are outlined in the annual performance plan (**APP + AR**).	**WHERE INFORMATION IS REPORTED:** The outcomes and its indicators and targets are outlined in the 5yr strategic plan (**SP**).	**WHERE INFORMATION IS REPORTED:** All outcomes contribute to the impact statement and its indicators outlined in the 5yr strategic plan (**SP**).

Table 6: DPME prescribed logic model framework for public sector planning and delivery

WCIF 2050, WCIS 2050 and WCIIP 2050 Logic Model Framework[29-32] (Theory of Change – Results Chain)

	IF INPUTS	THEN IF ACTIVITIES	THEN IF OUTPUTS	THEN IF OUTCOMES	THEN IMPACT
Each Strategic planning cycle covers a 5-year period: each period is decomposed into individual years, all having: 1. **Annual Performance Plan (APP)** 2. **Annual Operational Plan (AOP)** 3. **Annual Report (AR) all being part of Public sector planning compliance** **These documents are also informants to the service delivery improvement plan (SDIP).**	The financial, human, and material resources that are necessary for the activities to take place and the outputs to be produced.	Tasks undertaken to transform the inputs to outputs.	Outputs are the products and services produced. It is the results of a project.	**Focus Area Outcome:**A more resilient and spatially transformed Western Cape creates vibrant, liveable environments with improved access to opportunities, mobility, social and recreation infrastructure **Outcome 1:** Households have increased access to basic services and improved shelter **Outcome 2:** Investment in social infrastructure improves access to health, education, social development, and recreation opportunities **Outcome 3:** Infrastructure investment drives spatial transformation and improves spatial resilience **Outcome 4:** Mobility systems and transportation corridors provide safe and efficient connectivity to opportunities, services, and facilities	**PSP's Impact Statement:** Coordinated spatial planning, infrastructure, and mobility increase equitable value and access to economic opportunities, public spaces, services, and recreational facilities. **WCIF 2050's Impact Statement:** A flexible, innovative, and inclusive framework for collaborative infrastructure planning and asset management that informs and aligns sound decision-making and serves the needs of citizens, communities, enterprises, and the natural environment.

Table 7: WCIF 2050, WCIS 2050 and WCIIP 2050 logic model framework for infrastructure sector planning and delivery

6.10 Conclusion

The WCIF 2050 and its accompanying strategy (WCIS 2050) and implementation framework (WCIIP 2050) present a transformative approach to infrastructure governance, planning, and delivery in the Western Cape. It emphasises stakeholder collaboration, inclusivity, and ecological sustainability, aligned with the Panoptic Principles. This holistic and integrated perspective ensures that all infrastructure-related efforts are not only strategic but also context-sensitive, addressing the socio-economic and environmental needs of the province.

One of the core strengths of the WCIF 2050 and WCIS 2050 lies in its recognition of the complex interconnections within infrastructure value chains. By integrating insights from global and extended value chains (GVCs and EVCs), the WCIF 2050 and WCIS 2050 identifies and addresses the inherent power asymmetries and market dynamics that impact infrastructure outcomes. This understanding fosters more equitable, inclusive, and resilient infrastructure systems, capable of driving socio-economic growth and reducing inequality.

The SWOT analysis provides the challenges and opportunities in the current infrastructure ecosystem, revealing critical gaps in technical capabilities, funding mechanisms, and regulatory compliance. The WCIS 2050 responds to these challenges with targeted strategic thrusts, including fostering innovation, addressing compliance challenges, promoting empathetic and critical design orientations, and building capacity across the public and private sectors. These strategic thrusts provide a roadmap for addressing systemic weaknesses while leveraging opportunities for sustainable growth and resilience.

A key feature of the WCIS 2050 is its focus on long-term systemic transformation, supported by a robust Theory of Change and a Logic Model Framework. These tools ensure that the WCIS 2050 is both strategic and actionable, providing a clear pathway from resource allocation to measurable outcomes. The emphasis on outcomes such as households having increased access to basic services, improved social infrastructure, spatial resilience and economic infrastructure, and enhanced mobility highlights the framework's commitment to citizen-centric and sustainable development.

"An overarching blueprint for achieving the desired transformation, based on the identified challenges, the Theory of Change serves as the foundation for aligning strategies and actions toward a common vision."

Chapter 7

Western Cape Infrastructure Sector Prioritisation

7.1 Introduction

The WCG has adopted a forward-thinking approach to infrastructure planning, rooted in sustainability, resilience, and the protection of global public goods (GPGs). Building on the strategic foundations laid out in the WCIF 2050 and translating these into the WCIS 2050 and the WCIIP 2050, the Western Cape Infrastructure Sector Prioritisation Matrix provides a comprehensive framework for guiding infrastructure development, spatial transformation, and mobility. This matrix synthesises insights from the WCG's provincial departments to ensure that infrastructure sector priorities are both holistic and aligned with the WCG's broader goals.

Central to this framework is the recognition that infrastructure planning must address a variety of sectors, Social, Energy and Water, Economic, Technology, and Ecological, while pursuing four overarching outcomes: households have increased access to basic services, enhanced social infrastructure, spatial transformation and resilience, and efficient mobility systems. By systematically connecting these outcomes to each of the key sectors, the matrix creates a clear structure for evaluating projects and aligning them with the WCG's vision for sustainable development. This outcome-based approach helps maintain focus on pressing needs such as housing, clean energy, and resilient transportation networks, while also fostering equitable and inclusive growth.

Organised across short-, medium-, and long-term timelines, the matrix provides a dynamic roadmap for action. The short-term phase (1–5 years, up to 2030) emphasises rapid deployment and addressing urgent priorities, supported by innovative financing models. The medium-term phase (5–15 years, up to 2040) builds on earlier successes, scaling up investments and refining policy frameworks. Ultimately, the long-term phase (15–30 years, up to 2050) envisions a fully integrated infrastructure ecosystem that is sustainable, resilient, and capable of meeting the evolving needs of the province.

By offering a structured and phased approach, the Western Cape Infrastructure Sector Prioritisation Matrix ensures that infrastructure planning remains both adaptable and future focused. In doing so it addresses today's critical concerns, like energy sustainability, water security and spatial inequality, and also lays the groundwork for enduring social, economic, and ecological wellbeing. Through this integrated strategy, the WCG solidifies its position as a leader in responsible and forward-thinking infrastructure growth and development.

7.2 Integrating Global Public Goods into the WCG's WCIF 2050, WCIS 2050 and WCIIP 2050

The prioritisation in the WCIF 2050, WCIS 2050 and WCIIP 2050 is rooted in the principles of sustainability, resilience, and the protection of global public goods (GPGs). By aligning strategic planning with global imperatives such as the SDGs and national frameworks like the NDP, the WCG seeks to address critical challenges such as water security, food security, and energy sustainability.

The WCIF 2050 establishes a scientifically grounded foundation for decision-making; the WCIS 2050 outlines sector priorities; and the WCIIP 2050 operationalises these sector priorities through the panoptic scoring model to create a bankable portfolio of investment-ready projects. Together, these components ensure that the WCG's infrastructure ecosystem promotes localised sustainable development while addressing the long-term needs of both people and the environment.

Connecting prioritisation models to Global Public Goods (GPGs)

The traditional approach to prioritisation, characterised by ranking activities from most to least important, faces significant challenges, primarily around the question of who decides what is deemed "most important". While prioritisation practices are abundant with methodologies such as scales, rankings, weighted averages, and other frameworks, all claiming to offer equitable perspectives, these models often fall short in addressing deeper systemic issues. Despite their utility and the admirable effort to simplify priorities into comprehensible models, such approaches frequently overlook the singular, non-negotiable priorities that underpin viability, namely, the capacity for life to persist.

When considering strategic prioritisation, ecological integrity and the protection of authentic global public goods (GPGs) must take center stage. Humanity's history of terraforming the planet has directly led to Anthropocentric damage, exposing life on Earth to existential threats often referred to as extinction-level events[1-7]. Our current crisis of global warming is a direct result of "destructively blind development", highlighting a persistent bias in how economic and ecological perspectives are critically evaluated. These opposing paradigms, economics and ecology, are frequently in conflict with economic growth often prioritised at the expense of ecological sustainability.

At the heart of this tension lies an economic worldview that regards global public goods (GPGs) and natural resources as "free" and, therefore, largely absent from the input costs of human production[6,7]. This omission perpetuates a growth-driven bias, as depicted in Figure 1, where the primacy of GPGs is either undervalued or ignored altogether. Recognising and addressing this imbalance is imperative to redefine strategic prioritisation frameworks that are capable of safeguarding the long-term viability of both human and ecological systems. Importantly, elements of Social Justice need to be part of redress mechanisms.

WCIS 2050: Global Public Goods and prioritisation models

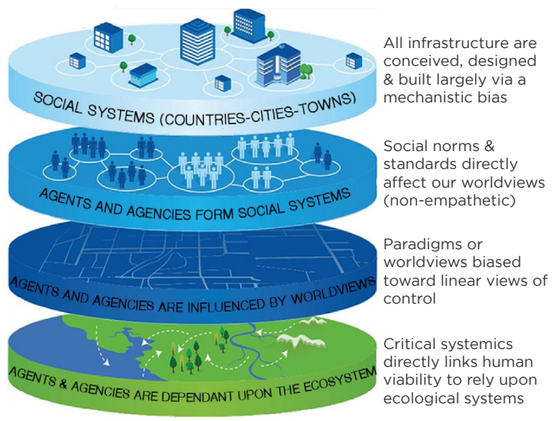


Figure 1: Mapping WCG Infrastructure into an "investor ready bankable portfolio"

Strategies informed by authentic global public goods (GPGs)

In its purest form, GPGs possess two defining qualities: non-excludability and non-rivalry[8-10]. Non-excludability implies that once a public good is provided to one party, it becomes accessible to all. Non-rivalry means that the consumption of the public good by one individual does not diminish its availability for others. Classic examples of GPGs include air, water, and soil; which are resources that are fundamental to life and shared universally.

The concept of GPGs has been extended to encompass what are sometimes referred to as national public goods, such as traffic control systems or national security. These goods benefit all citizens but are beyond the means of individuals to provide independently. Furthermore, GPGs have been categorised into various layers based on their scope of benefit[11]: global public goods that benefit all countries and people; international public goods

that serve multiple nations; regional public goods that benefit specific geographic areas; and national public goods that serve all citizens of a state. While these distinctions may serve analytical purposes, they become superfluous when viewed from the perspective of planetary function, as the Earth operates as an integrated whole. From a critical prioritisation standpoint, such categorisations dilute the core essence of GPGs and obscure their universal importance.

Recent interpretations have further complicated this by reclassifying "pure" GPGs, such as air, water, and soil, into prescriptive concepts like a stable climate, thriving ecosystems, effective global financial systems, or digitalisation[8]. While these may exhibit certain characteristics of GPGs, they fail to meet the foundational criteria of non-excludability and non-rivalry. This reframing shifts the focus from the authentic, planet-sustaining essence of GPGs to a broader array of goods deemed critical for modern global stability. However, this approach introduces a logical error, as these so-called public goods often serve narrower or conditional interests rather than universal, foundational viability.

To better understand this error, it is helpful to consider Maslow's hierarchy of needs, which outlines a framework for human viability. The hierarchy consists of five interrelated levels of needs, arranged by prepotency[12], meaning that lower-level needs must be met before higher-level ones can emerge. At the base are physiological needs, such as air, water, and food, which are foundational to survival. These are followed by safety needs and other higher-order requirements. From this perspective, true GPGs align with the basic physiological needs that sustain life. Recognising this alignment highlights the critical importance of authentic GPGs, such as air, water, and soil, in supporting the viability of both humanity and the planet. These must remain the central focus of prioritisation efforts, without being diluted by attempts to broaden the concept to encompass goods that, while important, are not universally fundamental to life.

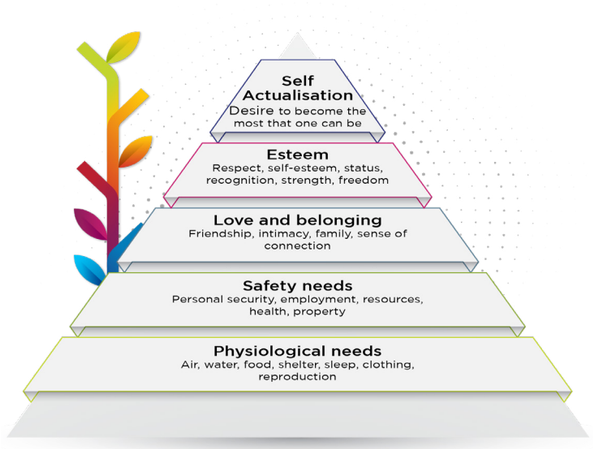


Figure 2: Hierarchy of needs and how it informs prioritisation strategies[12]

Research and practice consistently highlight the challenges associated with achieving definitional clarity for global public goods GPGs. The complexity is such that multilateral agencies, including the United Nations, have suggested that declaring something as a GPG is meaningful primarily within a political-economy context. This perspective emphasises that the specific legal and institutional frameworks in which GPGs are situated are what ultimately assure their delivery[9,10]. In other words, the designation of a GPG is not merely theoretical but relies heavily on the political and economic structures that support its provision and protection.

Beyond these definitional challenges, the need to reform the international system to better facilitate the provision of GPGs has been a consistent theme in multilateral initiatives. This underscores the growing prominence of GPGs in global governance, particularly as the world grapples with complex, interconnected issues such as climate change, biodiversity loss, and digital equity. Reform efforts aim to strengthen international cooperation, align policy frameworks, and enhance institutional capacity to ensure that GPGs are effectively delivered and maintained. The significance of GPGs in shaping the future of sustainable development is widely recognised, ensuring their centrality in policy agendas for decades to come[13-17].

It is within this context that the WCIF 2050's prioritisation model is designed to integrate seamlessly into the WCIS 2050 and the WCIIP 2050. This alignment reflects a deliberate, structured approach to strategic infrastructure planning, ensuring that prioritisation flows coherently from high-level frameworks to actionable implementation plans. Furthermore, the WCG seeks to distinguish itself by fostering collaborative approaches to develop prioritisation constructs and tools that maximise compliance and drive innovation. This dual focus on regulatory alignment and creative problem-solving positions the WCG as a leader in leveraging infrastructure planning to address both local and global challenges, with GPGs at the centre of its strategic direction.

How GPG strategies are enabled across the WCG's artefacts-of-action

The WCG's infrastructure ecosystem is purposefully designed to advance ecological, social, and economic remediation through a cohesive and well-structured prioritisation model. Rooted in its transformative Panoptic Principles, this model establishes a holistic foundation for sustainable infrastructure development and ensures seamless integration across planning and implementation stages.

The prioritisation process begins with the WCIF 2050, which sets the strategic vision and principles that guide sustainable decision-making. This vision is then translated into actionable sector-specific priorities in the WCIS 2050, across short-, medium-, and long-term horizons. Finally, these priorities are operationalised through the WCIIP 2050, which applies the innovative panoptic scoring model. This scoring model evaluates and prioritises projects to ensure they are strategically aligned to the identified sector priorities in the WCIS 2050 and are also bankable and investment-ready.

The WCIF 2050, WCIS 2050, and WCIIP 2050 collectively serve as actionable artefacts that link critical pathways to ensure long-term viability. At the heart of this approach are the WCG's foundational priorities of water security, food security, energy security, and waste treatment and disposal. These priorities are deliberately emphasised as non-negotiable, particularly given the region's ongoing challenges, such as water shortages, which highlight the urgency of addressing these critical needs.

This integrated and virtuous framework forms the cornerstone of the WCG's infrastructure ecosystem, enabling holistic and systematic responses to regional challenges. By seamlessly aligning strategic vision, sector-specific strategies, and implementation plans, critical needs are addressed while positioning infrastructure projects as opportunities for sustainable economic growth and ecological resilience.

As illustrated in Figure 3, the WCG's layered, purpose-driven approach addresses immediate priorities while fostering long-term resilience and sustainability for future generations. This ensures that infrastructure planning meets today's demands and safeguards the wellbeing of the Western Cape's people and ecosystems for decades to come.

Figure 3: Mapping Western Cape infrastructure into an "investor ready bankable portfolio"

WCIF 2050

Establishes a scientifically grounded framework, that integrates legal and policy directives across all levels of governance, from international to local or municipal contexts. It introduces Panoptic Principles that distils synthesised insights from a range of sources like SDGs, NDP, NSDF, King IV, ESG, and PSDF criteria. These serve as a comprehensive synthesis of global and national imperatives, forming the foundation for WCG infrastructure planning and decision-making.

WCIS 2050

The strategy of the framework (WCIS 2050) integrates long-term spatial transformation, infrastructure development, and mobility across five key sectors, Social, Energy and Water, Economic, Technology, and Ecological. The unique contexts of the sectoral priorities serve as guide to their respective prioritisation programming, as noted in the Prioritisation Matrix. It serves as guiding tool for investment, policy, and project prioritisation, without compromising sustainability and resilience across the province.

WCIIP 2050

The implementation of the framework (WCIIP 2050) acts as the third layer of filtration of projects. This is achieved by applying the panoptic scoring model to migrate the prioritised project pipeline of projects, into a Bankable Pipeline Portfolio. This portfolio represents a curated suite of projects compliant with legal, technical, and financial standards. This level of detail provides confidence to investors and financiers regarding actionable investment opportunities in the Western Cape.

WCIF 2050 – Establishes a scientifically grounded framework, guided by Panoptic Principles, to govern the WCG's infrastructure ecosystem. The WCIF 2050 is anchored in a primary layer prioritisation process that integrates legal and policy directives across all levels of governance, from international to local or municipal contexts. The Panoptic Principles distill diverse viewpoints on prioritisation, synthesising insights from a range of sources that include the SDGs, NDP, NSDF, King IV and ESG criteria. The Panoptic Principles serve as a comprehensive synthesis of global and national imperatives, creating a robust foundation for sustainable infrastructure planning and decision-making.

WCIS 2050 – The Western Cape Infrastructure Sector Prioritisation Matrix is a key part of the strategic framing that integrates long-term spatial transformation, infrastructure development, and mobility across key sectors, Social, Energy and Water, Economic, Technology, and Ecological. Each of these sectors contain unique contexts and conditions which guide their respective prioritisation programming.

These sectors are aligned with four critical outcomes, derived from the PSP and WCIS 2050, which are focused on households having increased access to basic services, enhancing social infrastructure for equitable access to health, education, social and recreation opportunities, driving spatial transformation for resilient and connected communities, and ensuring safe and efficient mobility systems. Spanning three timelines (short-term up to 2030, medium-term up to 2040, and long-term up to 2050), the Western Cape Infrastructure Sector Prioritisation Matrix forms the basis of a secondary layer of prioritisation and ensures a phased approach to achieving foundational improvements, scaling up investments, and fostering sustainable, transformative development. By linking infrastructure planning with these outcomes and sectors, the matrix serves as a cohesive tool to guide investment, policy, and project prioritisation, addressing urgent needs while promoting sustainability and resilience across the province.

WCIIP 2050 – Acts as the third layer of prioritisation, applying the panoptic scoring model to refine the prioritised project pipeline into a **Bankable Pipeline Portfolio**. This process ensures that projects meet all policy-prescribed criteria, enabling them to be classified as investment-ready. The Bankable Pipeline Portfolio represents a carefully curated suite of projects that comply with legal, technical, and financial standards, providing clarity and confidence to investors and financiers. By doing so, the WCIIP 2050 ensures a seamless transition from strategic prioritisation to actionable investment opportunities, fostering greater collaboration between the public and private sectors in delivering sustainable infrastructure outcomes.

Together, the WCIF 2050, WCIS 2050, and WCIIP 2050 form an integrated framework that bridges strategic vision, sector-specific prioritisation, and implementation-readiness. This cohesive system positions the WCG to address both immediate infrastructure needs and long-term resilience, ensuring that projects align with the region's sustainability objectives and attract meaningful investment.

These governance gates ensure that the WCG delivers relevant, necessary, bankable, and prioritised infrastructure projects (Figure 3). By incorporating multi-stage prioritisation layers, this approach mitigates tensions that could otherwise compete with or compromise the WCG's strategic goals. It challenges traditional development models by promoting localised, sustainable living that intuitively links human survival to a healthy and thriving ecology[18]. Recognising the destructive tendencies of traditional industrialisation, which often exploit GPGs[19], the WCG's strategic paradigm adopts a more cautious and systemic approach. This approach prioritises public and mutual interests over self-interest, fostering long-term ecological and social resilience[6,19].

A key feature of this governance framework is its adaptability. These governance gates allow for the lifting or softening of criteria in special circumstances, ensuring that the system facilitates integrated and efficient infrastructure delivery rather than hindering it. By balancing rigour with flexibility, the WCG's governance model provides a robust yet adaptive mechanism for achieving its vision of sustainable and equitable infrastructure development.

Conclusion

The WCIF 2050, WCIS 2050, and WCIIP 2050 exemplify a holistic and strategic approach to sustainable development. Guided by Panoptic Principles and aligned with global and national imperatives, it integrates legal, policy, and sector-specific priorities to deliver impactful and resilient infrastructure solutions. The multi-layered prioritisation process ensures that infrastructure projects are aligned with sustainability goals and are bankable and investment-ready, fostering collaboration between public and private sectors. By addressing immediate regional needs while maintaining a focus on long-term ecological, social, and economic resilience, the WCG challenges traditional development paradigms and promotes localised sustainable living. This cohesive and adaptive governance model positions the Western Cape as a leader in leveraging infrastructure to create a thriving, equitable, and sustainable future for all.

7.3 Western Cape Infrastructure Sector Prioritisation

The Western Cape **Infrastructure Sector Prioritisation Matrix** provides a comprehensive and strategic framework for guiding infrastructure planning, spatial transformation, and mobility development. Grounded in the principles of the **WCIF 2050**, **WCIS 2050**, and **WCIIP 2050**, the matrix integrates valuable inputs from **provincial departments**, including Infrastructure, the Department of the Premier, Provincial Treasury, Local Government, Environmental Affairs and Development Planning, Economic Development and Tourism, Agriculture, Education, Health and Wellness, Mobility, Social Development, and Cultural Affairs and Sport, ensuring a holistic understanding of sectoral needs. This collaborative approach addresses key infrastructure sectors, being **Social, Energy and Water, Economic, Technology, and Ecological**, and aligns them with the WCG's provincial goals. The matrix focuses on achieving four **Outcomes**: households have increased access to basic services, enhanced social infrastructure, spatial transformation and resilience, and effective mobility systems. Organised across **short-, medium, and long-term timelines**, it provides a dynamic, actionable roadmap for building a resilient, equitable, and sustainable infrastructure ecosystem that meets the needs of the province.

Furthermore, in complete alignment with the G4J Strategy and its Priority Focus Area 6: Infrastructure and Connected Economy, strategic **Catalytic infrastructure** such as efficient transportation networks, reliable energy supplies, and advanced communication systems play a crucial role in reducing the cost of doing business, attracting further investment, and enabling the smooth flow of goods and services. Developed, reliable infrastructure lays the foundation for a well-functioning, competitive economy and enables the wellbeing of citizens. Economic growth requires economic infrastructure, such as roads and electricity generation and water infrastructure, which support productive activities, and social infrastructure which enables the functionality of communities. While all infrastructure is prioritised, particular attention is needed around infrastructure for connectivity, which includes both the movement of goods and people (mobility) and digital connectivity. Infrastructure is a crucial foundation for economic growth. Research shows that a 10% increase in infrastructure assets increases GDP per capita by 0.7%. There is a key competitive advantage to be gained if the province can break out of the slump that infrastructure currently finds itself in nationally where risks from shocks such as climate change and unrest are not properly engaged.

Western Cape Infrastructure Sector Prioritisation Matrix

The **Infrastructure Sector Prioritisation** matrix represents a strategic framework for achieving long-term spatial transformation, infrastructure development, and mobility in the Western Cape, through a systematic approach aligned with key priority sectors. This approach uses a timeline and a set of strategic outcomes to guide and evaluate progress over time, ensuring that infrastructure, spatial planning, and mobility goals are addressed within the context of infrastructure growth and development.

Timeline

The timeline spans three distinct periods:

- **Short-Term (1-5 years, up to 2030)**: This phase focuses on setting the foundation and achieving early gains in infrastructure and spatial transformation. The emphasis will be on quick wins, addressing urgent needs in the key priority sectors and implementing new models of financing infrastructure projects.
- **Medium-Term (5-15 years, up to 2040)**: In this period, the focus will shift towards scaling up investments and solidifying the gains from the short term. It allows for the development of more advanced strategies, policies, and systems that can address complex infrastructure and spatial transformation needs in greater depth.
- **Long-Term (15-30 years, up to 2050)**: This phase envisions long-term, sustainable development and transformational changes in infrastructure, spatial development, mobility, and digital, with an aim to create a fully integrated, resilient, and connected province.

Vertical Axis: PSP and WCIS 2050's Outcomes

The **vertical axis** contains the four outcomes for Spatial Transformation, Infrastructure, and Mobility as stated in the **PSP** and the **WCIS 2050**. These four outcomes guide the development of each infrastructure sector, ensuring that the provincial goals are met.

1. **Outcome 1: Households have increased access to basic services and improved shelter**
   This outcome targets improvements in human settlements (social infrastructure), such as water, sanitation, waste management services, housing, and other essential services, ensuring that all households benefit from better living conditions.

2. **Outcome 2: Investment in social infrastructure improves access to health, education, social development, and recreation opportunities**
   Focused on enhancing social infrastructure, this outcome aims to ensure that investments in infrastructure provide equitable access to services like healthcare, education, social development, and recreation; and environmental health and environmental quality monitoring infrastructure, contributing to the overall wellbeing of communities.

3. **Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience**
   This outcome addresses the need for infrastructure investments that contribute to the reshaping of geographic and spatial layouts, creating more balanced, resilient, and connected communities. Specifically, it focuses on economic infrastructure, including the development of road networks, gravel roads, and rural infrastructure (defined as the basic physical structures, facilities, and services necessary for the functioning and development of rural areas). It includes essential systems that support economic activities, improve quality of life, and enable access to markets, services, and opportunities), to enhance connectivity and foster economic integration across urban and rural areas.

4. **Outcome 4: Mobility systems and transportation corridors provide safe and efficient connectivity to opportunities, services, and facilities**
   This outcome emphasises the importance of mobility as a fundamental driver of economic growth, ensuring that transportation networks enable efficient movement and connectivity between economic, residential and social areas. It also includes the mobility of collected waste and recovered material/recyclables, which rely on mobility/logistics and the various modes of transportation infrastructure. It further includes digital connectivity and transformation to ensure digital public infrastructure and systems that support the capabilities of government.

Horizontal Axis: Key Infrastructure Sectors

The **horizontal axis** represents the **key infrastructure sectors**, which will drive the transformation and development process across the entire timeline:

1. **Social**: Focus on improving the wellbeing of households, ensuring that basic services and social infrastructure are accessible to all.
2. **Energy and Water**: Address energy and water needs, with a focus on sustainable energy and water sources and improving energy access and water supply across different regions.
3. **Economic**: Encourage economic growth and development, ensuring that infrastructure investments enable better economic opportunities and competitiveness.
4. **Technology**: Incorporate technological innovations to improve efficiency and access to services, such as smart infrastructure and digital connectivity.
5. **Ecological**: Address environmental sustainability, promoting green infrastructure, eco-friendly technologies, and natural resource management to ensure healthy functioning of ecosystems.

Infrastructure Sectors

Infrastructure Sectors	Actions
Infrastructure	▸ For the WCIF 2050, infrastructure is defined as “fixed assets” within the built environment that “facilitate the delivery of services and unlock economic and growth opportunities”. This definition includes traditional engineering infrastructure, social services, property and buildings, ICT infrastructure, and ecological infrastructure.
Social Infrastructure	▸ Public administration (offices, government buildings) ▸ Housing (top structures, service sites, including affordable housing and informal settlements) ▸ Education (primary and secondary schools, student housing) ▸ Health (hospitals, clinics, EMS, FPL, office buildings, workshops/warehouses) ▸ Social development (community-based care and support services centres, homeless shelters, places of safety) ▸ Culture (libraries, theatres, museums) ▸ Security (prisons, police) ▸ Sport (recreational, professional) ▸ Leisure (recreational, picnic areas, parks) ▸ Recreational routes ▸ Heritage (including cultural and other significant buildings/structures, etc.) ▸ Mobility (including NMT and universal) ▸ Waste (drop-off centres, waste transfer stations, waste management facilities ▸ Infrastructure that enhances citizens’ and businesses quality of life
Energy Infrastructure	▸ Electricity (all related generation, storage, transmission and distribution networks) ▸ Power generation facilities ▸ Transmission networks ▸ Distribution networks ▸ Energy storage systems ▸ Renewable energy ▸ Oil and natural gas pipelines ▸ Nuclear energy
Water Infrastructure	▸ Man-made water supply resources (domestic and industrial) ▸ Natural ecosystems that support and provision water and cycle nutrients ▸ Water reticulation and sanitation ▸ Sewerage and waste disposal (domestic and industrial wastewater) ▸ Solid waste (domestic and industrial) ▸ Wastewater ▸ Roads and stormwater

Infrastructure Sectors	Actions
Economic Infrastructure	▸ Roads ▸ Rail networks ▸ Public local transport ▸ Ports and cruise terminals ▸ Small harbours ▸ Warehousing and storage (online retail) ▸ Freight forwarding ▸ Aviation (airport services, airline services, air traffic control) ▸ Economic development infrastructure, commercial and industrial buildings, complexes and hubs, central business districts ▸ Integrated waste management facilities, material recovery facilities, waste treatment facilities (composting, biodigesters, etc.)
Technology Infrastructure	▸ Telecommunications (cabling, satellites, fibre optics, mobile technology and devices) ▸ Broadband (high speed internet access) ▸ Cloud and Data centres ▸ Big data ▸ New technologies (electric vehicles, AI, etc.) ▸ Digital Government Platforms (e-Government) ▸ Smart city platforms integrating ICT, AI and IoT for urban management ▸ Intelligent transport systems
Ecological Infrastructure	▸ Pollution control, including improving air quality ▸ Rivers and wetlands ▸ Nature reserves ▸ Strategic catchment areas ▸ Estuaries ▸ Watercourses ▸ Beaches ▸ Coasts ▸ Coastal public property (including the Provincial Conservation Estate) ▸ Ecological corridors ▸ Urban open spaces ▸ Food gardens
Catalytic Infrastructure (for which projects may fall into one of the above sector categories)	Extracted from Discussion Document: Rethinking Project Classifications for G4J Strategy Implementation, February 2023, WCG: ▸ The National Treasury's 2015/16 – 2017/18 BEPP Guidelines (Built Environment Performance Plan) Guidelines, provides further insights into the context in which catalytic development projects are used, and defined. The intent with catalytic projects is clear, namely, to influence and bring intentional and targeted change, often in targeted and identified geographical areas. For the purpose of the BEPP, the definition of 'catalytic urban development projects' is – "land development initiatives that: a. Are integrated, that have mixed and intensified land uses where the residential land use caters for people across various income bands and at increased densities that better support the viability of public transport systems. b. Are strategically located within integration zones in cities; and are game changers in that the nature and scope of the projects are likely to have significant impact on spatial form. c. Require major infrastructure investment. d. Require a blend of finance where a mix of public funds can leverage private sector investment as well as unlock household investment. e. Require specific skills across several professions and have multiple stakeholders." ▸ Catalytic projects' are a distinct category of interventions, defined by a specific set of characteristics that are often linked to deliberate intent, specific change required, is long-term focused, and is outcomes focused (externally or societal focused), it demands adequate and dedicated resources, is complex, mega-scale in nature, is interventionist in nature, and are in many instances reliant on partnerships which in its own right requires different institutional set-ups from the typical bureaucratic government processes and frameworks. In almost all instances, these 'catalytic' interventions are linked to the Planning and Budgeting system of planning in South Africa, and importantly, it is linked to physical-spatial transformation or integration or priority investment areas or zones. ▸ Strategic catalytic infrastructure could include transportation networks, reliable energy supplies, and advanced communication systems. These play a crucial role in reducing the cost of doing business, attracting further investment, and enabling the smooth flow of goods and services. Developed, reliable infrastructure lays the foundation for a well-functioning, competitive economy and enables the wellbeing of citizens. Economic growth requires economic infrastructure, such as roads and electrical substations, which support productive activities, and social infrastructure which enables the functionality of communities. While all infrastructure is prioritised, particular attention is needed around infrastructure for connectivity, which includes both the movement of goods and people (mobility) and digital connectivity. Infrastructure is a crucial foundation for economic growth.

Table 1: Infrastructure Sectors

How the Infrastructure Sector Prioritisation Matrix Works

The Infrastructure Sector Prioritisation matrix structure provides a clear, dynamic roadmap for prioritising actions over the different timeframes. Each of the key infrastructure sectors (Social, Energy and Water, Economic, Technology, and Ecological) is integrated across the four PSP and WCIS 2050's Outcomes, allowing for an assessment of progress in achieving access to basic human needs, social infrastructure development, spatial transformation and improved mobility.

The Outcomes guide the focus of each sector, ensuring alignment with the WCG's goals. By tracking each sector's contribution to these Outcomes over the three timeframes, the matrix ensures that the WCG's infrastructure sector priorities are continuously met:

- **Short-Term (1-5 years)**: Early actions focus on immediate infrastructure needs, foundational work with a focus on alternative financing models.
- **Medium-Term (5-15 years)**: The focus will shift toward scaling up the impact of short-term actions, with a more integrated approach to sectors.
- **Long-Term (15-30 years)**: The final phase is aimed at full integration and system-wide transformation. The goal is to have a highly efficient, sustainable, and equitable infrastructure system across all sectors, contributing to spatial resilience and providing optimal connectivity for all communities.

Conclusion

The Western Cape **Infrastructure Sector Prioritisation Matrix** serves as a critical tool for driving the Western Cape's infrastructure transformation over the next three decades. By aligning the contributions of diverse sectors to the PSP and WCIS 2050 outcomes, the matrix ensures that the infrastructure priorities remain adaptive, inclusive, and forward-thinking. The phased timeline approach, spanning short-, medium-, and long-term goals, supports a progressive, integrated, and transformative vision for infrastructure development, while emphasising sustainability, connectivity, and social equity. This framework addresses current challenges and lays the foundation for a future-ready Western Cape, capable of delivering meaningful and lasting benefits to its citizens, communities, and natural environment.

7.4 Western Cape Infrastructure Sector Priorities

The infrastructure sector priorities have been provided for by each of the WCG's provincial departments, being Infrastructure, Department of the Premier, Provincial Treasury, Local Government, Environmental Affairs and Development Planning, Economic Development and Tourism through the Growth for Jobs lens, Agriculture, Education, Health and Wellness, Mobility, Social Development, and Cultural Affairs and Sport.

"The WCG has adopted a forward-thinking approach to infrastructure planning, rooted in sustainability, resilience, and the protection of global public goods (GPGs)."

Outcome 1: Households have increased access to basic services and improved shelter

Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
1. Expand affordable housing programmes (First Home Finance; Deferred Ownership; Social Housing). Investigate and implement alternative financing models and public-private partnerships. 2. Identify and prioritise locations for integrated human settlements. Begin the development of at least 1 pilot integrated settlements with mixed-use housing and climate-resilient infrastructure. 3. Invest in upgrading informal settlements by improving access to basic services (water, sanitation, electricity). Include waste management (collection and recovery). Settlements include backyard dwellers who are overlooked in the provision of basic services. 4. Introduce neighbourhood shaded areas as heat refuges.	**Energy:** 1. Renewable energy access programmes to provide affordable and sustainable power to households. 2. Pilot community microgrid projects in off-grid areas for decentralised energy solutions. 3. Energy-efficient programmes for low-income households to reduce household energy consumption. 4. Include passive cooling designs in new build and retrofits to limit energy requirements for cooling. **Water:** 1. Implement rainwater harvesting. 2. Incorporate green building standards into affordable housing programmes. 3. Include rainwater harvesting and water conservation solutions. 4. Pilot suitable decentralised effluent management systems. **Stormwater:** 1. Establish sustainable urban drainage systems and urban green spaces within integrated settlements which assist with stormwater management including runoff quality) and reduce urban flooding. Include water sensitive design principles and solutions.	1. Leverage local supply chains to support job creation in human settlements infrastructure projects.	1. Enhance digital connectivity in housing projects to provide internet access for all households. 2. Introduce smart infrastructure solutions for resource monitoring in pilot integrated settlement. 3. Develop a digital platform to streamline service delivery for upgraded informal settlements. 4. Upgrade and use of technology at sewerage facilities to increase efficiency at these facilities. 5. Invest in technological solutions for security measures on infrastructure e.g. immediate leak detection and shut off, perimeter breach.	1. Facilitate the development of sustainable settlements (and the expansion of existing settlements) through environmental planning – to proactively identify (un)suitable areas for human settlement development. 2. Incorporate green building and sustainable urban water, waste and sewage management standards into affordable housing programmes (and address backlogs). 3. Ecological impact of spills and collapsed infrastructure to be remediated. 4. Facilitate the development of sustainable settlements (and the expansion or existing settlements) through environmental planning - to proactively identify (un)suitable areas for human settlement development.

Outcome 1: Households have increased access to basic services and improved shelter

Sector priorities for the Medium-term planning range (5 to 15 years)

Social	Energy & Water	Economic	Technology	Ecological
1. Further expansion of affordable housing programmes (First Home Finance; Deferred Ownership; Social Housing). 2. Expand the development of additional 2 integrated human settlements, ensuring these projects include schools, healthcare centres, and enhancing green spaces (to foster community engagement and social interaction). 3. Increase investment in upgrading informal settlements by improving access to basic services (water, sanitation, electricity & transport/access) and promoting urban greening to improve air filtration.	1. Scale up renewable energy access programmes to provide affordable and sustainable power to households. 2. Community microgrid projects in off-grid areas for decentralised energy and water/wastewater solutions. 3. Scale up energy-efficient programmes for low-income households to reduce household energy consumption, improve insulation and ventilation, and reduce indoor air pollution. 4. Expand water recycling.	1. Increased leverage in local supply chains to support job creation in human settlements infrastructure projects.	1. Enhance digital connectivity in housing projects to provide internet access for all households. 2. Introduce smart infrastructure solutions for resource monitoring in 2 integrated human settlements. 3. Scale up data-driven monitoring systems for public services in informal settlements to improve efficiency and real-time air pollution tracking. 4. Ongoing programmes to raise awareness and share knowledge to overcome barriers in the use of new technology.	1. Incorporate green building and sustainable urban water, waste and sewage management standards into affordable housing programmes. 2. Establish urban green spaces, including consideration to be given to greening of neighbourhoods beyond its open spaces (i.e. streets and erven) within integrated settlements to enhance climate resilience and improve air filtration.

Outcome 1: Households have increased access to basic services and improved shelter

Sector priorities for the Long-term planning range (15 to 30 years)

Social	Energy & Water	Economic	Technology	Ecological
1. Universal access to affordable housing with innovative financing models, including equity-based ownership options. 2. Multi-generational, mixed-use settlements with inclusive urban planning. 3. Ensure that communities in the Western Cape have equitable access to essential services and facilities.	1. Energy efficient designs and scale up solar programmes for low-income households. 2. Ensure reliable and affordable access to energy for all households in the Western Cape, including those in remote and underserved areas, through grid extension and off-grid renewable energy solutions. 3. Improve water infrastructure to ensure equitable access to safe and reliable water services for all communities across the Western Cape, addressing disparities in access and quality. 4. Basic service infrastructure to be upgraded such as at WWT plants. 5. Implement proven innovative decentralised effluent treatment solutions. 6. Make clean energy more accessible to all communities.	1. Develop public-private partnership programmes for sustainable, energy efficient, low-emissions, affordable housing. 2. Support economic growth and development through innovative financing models for affordable housing, fostering local economic growth and job creation in construction and related industries. 3. Encourage economic diversity and entrepreneurship in mixed-use settlements by providing spaces for small businesses, cultural activities, and community services. 4. Promote inclusive economic growth by ensuring that all communities have access to economic opportunities and support services, enhancing local economies throughout the Western Cape. 5. Support local green jobs and clean energy jobs.	1. Promote homes with sustainable, low-emission materials. 2. Expand broadband and digital infrastructure to ensure equitable access to technology and information services across all communities in the Western Cape, promoting digital literacy and economic development. 3. Implement energy efficiency technologies in public transport and shared mobility options to reduce emissions.	1. Expand water sensitive urban design and nature based solutions to all housing developments. 2. Incorporate green building and sustainable urban water management standards into affordable housing programmes. 3. Establish urban green spaces within integrated settlements to enhance climate resilience. 4. Implement large-scale urban reforestation and air-purifying vegetation in communities, and eco-friendly infrastructure in public facilities, for sustainable water management and air pollution reduction.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Overall: 1. Repair and refurbish health clinics, schools, and recreational centres. 2. Require shaded spaces (such as trees), in and around social facilities as heat refuges.	**Overall:** 1. Upgrade electricity access in public facilities (health and education). 2. Waste management should be included in social infrastructure - waste collected and recovered needs waste management infrastructure such as waste transfer stations, waste recovery facilities (MRFs), waste treatment facilities, and/or waste disposal facilities. 3. Retrofit health clinics, schools, and recreational centres for water and energy efficiency, as well as with air emission abatement or green ventilation technologies. 4. Utilise passive cooling designs for buildings to limit energy demands and provide heat refuges.	**Overall:** 1. Foster strategic partnerships through the implementation of public-private partnerships for social infrastructure capital projects.	**Overall:** 1. Expand broadband access and mesh-networks in low-income areas to support education, job searches, and digital inclusion. 2. Encourage software design and algorithm utility to serve the citizen as a priority to build trust and ensure algorithmic empathy & prevent data harvesting.	**Overall:** 1. Retrofit health clinics, schools, and recreational centres for water and energy efficiency, as well as with air emission abatement or green ventilation technologies.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Health: 1. Address the immediate WCGHW Infrastructure priorities in terms of the R40 billion plus infrastructure backlog. 2. R1 billion maintenance needs per year. This will be done by completing the following plus attending to ongoing maintenance: ▸ 28 Clinic facilities Capital projects (inclusive of new/ replacement/upgrade & Additions and R, R and R) plus 16 maintenance projects, ▸ 4 Ambulance stations Capital projects, ▸ 16 District Hospitals Capital projects and 6 maintenance projects, ▸ 13 Regional Hospitals Capital projects and 5 maintenance projects, ▸ 32 Central Hospital Capital projects and 10 maintenance projects, ▸ 5 Other buildings Capital projects and 2 maintenance projects	**Health:** 1. At least 12% of Infrastructure spent spent will be towards the electrical installations and/or upgrades which are inclusive of renewables. 2. Energy saving initiatives will be undertaken at a number of Hospitals via ESCO contracts in order to optimise the energy and water usage. 3. Continue to expand our investment in solar. All new facilities will incorporate elements of solar usage and existing retrofitting will take place provided roofing construction and material will allow this. 4. All new facilities will comply with technical memoranda on water conservation, solar installation. 5. Improve ventilation systems for improvement of air quality within facilities, wastewater treatment and where possible land available food gardens in partnership with communities. 6. Prioritise net zero carbon design where new facilities are being designed.	**Health:** 1. Embed social infrastructure as a core driver of inclusive growth.(note the position of our facilities are chosen to ensure good access to communities). 2. Continue with Tygerberg Central PPP. 3. Leverage BFI funding via the National Treasury. 4. Develop and apply Norms and Standards for facility and room layouts as well as materials, fixtures and fittings wherever possible.	**Health:** 1. At least 1% of Infrastructure spent will be towards broadband access, telecommunications within WCGHW facilities and in new facilities.	**Health:** 1. All new facilities will comply with technical memoranda on water conservation, solar installation, improvement of air quality within facilities, wastewater treatment and where possible land available food gardens in partnership with Communities. 2. Prioritise net zero carbon design where new facilities are being designed. 3. Hazardous materials removal programme. Address the risk with asbestos and other inappropriate materials based on renewed risk assessment.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities

Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
Education: 1. Address the short term WCED Infrastructure priorities in terms of the R7 billion plus infrastructure backlog as well as the required R1.8 billion maintenance needs per year. 2. Expand school capacity in areas of highest excess demand using various technologies and delivery mechanisms, including school self-builds. Expand schools to make provision for Grade R and ECD, where feasible. 3. Provide access to learning opportunities in the form of new, modern public schools. 4. Roof replacement programme. Conduct fixed asset portfolio analysis and address structural vulnerabilities with roofing as the component contributing to most corrective maintenance requests. 5. Public school infrastructure renewal program. Upgrade and refurbish existing facilities to increase functionality.	**Education:** 1. Continue focus on energy efficiency, in respect of the retrofitting of light fittings and other measures to facilitate cost savings for schools. 2. Continue to expand our investment in solar. All new schools will receive solar and energy storage capacity. 5% of the budget earmarked. 3. Continue to invest in water conservation efforts through the provision of water tanks and the feasibility of boreholes at new school facilities. 4. Incorporate passive cooling designs for buildings and Incorporate shaded space (such as trees) in and around waiting & playing areas as heat refuges.	**Education:** 1. Continue EduInvest campaign to attract investments into low-cost new private schools to alleviate overcrowding and improve access to quality education. 2. Expand the Collaboration Schools model in the province to 15 schools over the current MTEF period, which will attract an estimated R300m in private sector funding pledged with existing partnerships. 3. Partner with the World Bank to explore the use of public or philanthropic money to improve the risk–return profile or commercial viability of investments for private investors.	**Education:** 1. Leverage broadband capabilities and LAN facilities to provide access to digital learning hubs. 2. All new schools to be fitted with telecommunication and IT facilities to provide hybrid learning options. At least 3% of new school infrastructure spend will be towards digital capabilities.	**Education:** 1. Hazardous materials removal program. Address the risk with asbestos and other inappropriate materials based on renewed risk assessment. 2. Continue to invest in water conservation efforts through the provision of water tanks and the feasibility of boreholes at new school facilities.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities

Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
Social Development: 1. Review DOI portfolio to identify un-utilised or under-utilised properties with the potential for leveraging NGO partnership opportunities. 2. Maintenance/upgrades of WCG Secure Child and Youth Care Centres for children in conflict with the law and children with severe behavioural problems, including security. 3. Critical maintenance of service point infrastructure to improve customer experience and OHS compliance. 4. New CYCC to be constructed at Siyakathala site. 5. New service point accommodation/infrastructure to expand the Department's footprint.	**Social Development:** 1. Shift to solar at facilities where possible (diesel for loadshedding unsustainable). 2. Revitalising the bore holes at Secure Care Centres in order to ensure sufficient water provision without being exposed to increase in rise in water cost. Boreholes were mothballed after the drought. Water can be utilised as grey water or untreated water for ablution and grounds purposes. 3. Retrofit social facilities for water and energy efficiency, and incorporating clean air solutions such as improved ventilation, air filtration systems. 4. Utilise passive cooling designs for buildings to limit energy demands and provide heat refuges.	**Social Development:** 1. Leverage existing WCG infrastructure to create income streams to improve sustainability of NGO partners rendering strategic social services.	**Social Development:** 1. Improved network access for use of central admissions systems. 2. Improved network access for use of frontline service delivery systems. 3. Use of mobile service points as an alternative to fixed accommodation.	**Social Development:** 1. Plant indigenous trees for shade and heat refuges in and around facilities.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities

Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
Recreation: 1. Inadequate Space in the Provincial Archives in Roeland Street, Cape Town. New wing required on the same footprint to address backlog and possible future growth or alternatively a purpose-built new Archive facility outside of the City Bowl but in proximity to a Fire Department. 2. New Delivery Model for Public Libraries to meet the needs of growing WC population. New Model includes Library as a multi-purpose Arts Hub or Community Arts Centre sharing space with Museums, Art Galleries and Performance spaces rather than stand-alone libraries. 3. Shared Recreation Facilities to support School Clusters; we currently manage shared facilities in Lavender Hill, George, Beaufort West, Malmesbury and we are currently working with WCED and DOI on others. 4. Infrastructure upgrades in line with the new usage model for cultural facilities. 5. Renovate Property next door to the Cape Town Museum Walk-in Centre on 148 Long Street in order to expand the Walk-in Centre.	**Recreation:** 1. Electrify all DCAS facilities with renewables. 2. Install solar-powered lighting in parks and recreational centres. 3. Utilise passive cooling designs for buildings to limit energy demands and provide heat refuges.	**Recreation:** 1. Improve road access to new World Heritage Sites – Cradle of Human Culture in Elands Bay – Diepkloof Rockshelter. 2. Improvement of access road of R301 to Madiba House at the Drakenstein Prison National Heritage site. 3. Develop green job programmes focused on maintaining and improving recreational spaces.	**Recreation:** 1. Expand broadband access and mesh-networks in low-income areas to support education, job searches, and digital inclusion – Libraries as nodes in rural areas. 2. Install real-time air quality monitoring and recycling systems in recreational spaces.	**Recreation:** 1. Enhance ecological buffers around World Heritage Sites increase resilience as per requirements of the Conservation Management Plans. Consider acquiring the property that the World Heritage (Diepkloof Rock Shelter) site is on. 2. Expand urban green spaces and nature-based recreational areas to naturally filter air pollution. 3. Ensure provincial conservation estate is optimally managed and protected whilst enabling citizen access from recreation and spiritual purposes. 4. Plant indigenous trees for shade and heat refuges in and around facilities.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities

Sector priorities for the Medium-term planning range (5 to 15 years)

Social	Energy & Water	Economic	Technology	Ecological
Overall: 1. Expand tertiary healthcare, universities, and community hubs.	**Overall:** 1. Electrify all health and education facilities with renewables. 2. Utilise passive cooling designs for buildings to limit energy demands and provide heat refuges.	**Overall:** 3. Scale impact investment in social infrastructure projects.	**Overall:** 1. Expand digital infrastructure to boost rural resilience. 2. Establish digital literacy programmes alongside technology infrastructure rollouts.	**Overall:** 1. Enhance ecological buffers around social infrastructure to increase resilience. 2. Ensure provincial conservation estate is optimally managed and protected whilst enabling citizen access from recreation and spiritual purposes. 3. Plant indigenous trees for shade and heat refuges in and around facilities.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Health: 1. Address the medium term WCGHW Infrastructure priorities in terms of the R40 billion plus infrastructure backlog as well as the required R1.5 billion maintenance needs per year. This will be done by completing the following plus attending to ongoing maintenance: ▸ 105 Clinic facilities Capital projects (inclusive of new/ replacement/upgrade & Additions and R, R and R) ▸ 19 Ambulance stations Capital projects, ▸ 40 District Hospitals Capital projects ▸ 25 Regional Hospitals Capital projects ▸ 18 Central Hospital Capital projects ▸ 30 Other buildings Capital projects	**Health:** 1. At least 12% of Infrastructure spent will be towards the electrical installations and/or upgrades which is inclusive of renewables and decreased energy usage. 2. Continue to expand our investment in solar. All new facilities will incorporate elements of solar usage and existing retrofitting will take place provided roofing construction and material will allow this.	**Health:** 1. Embed social infrastructure as a core driver of inclusive growth. (Note the position of our facilities are chosen to ensure good access to communities). 2. Continue with Tygerberg Central PPP. 3. Leverage BFI funding via the National Treasury. 4. Develop and apply Norms and Standards for facility and room layouts as well as materials, fixtures and fittings wherever possible.	**Health:** 1. At least 1% of Infrastructure spent will be towards broadband access, telecommunications within WCGHW facilities and in new facilities. 2. Embed telemedicine as part of our health facilities design and implement any new technology.	**Health:** 1. All new facilities will comply with technical memoranda on water conservation, solar installation, improvement of air quality within facilities, wastewater treatment and where possible land available food gardens in partnership with Communities. 2. Continued research and implementation on net zero design of Health facilities. 3. Hazardous materials removal programme. Address the risk with asbestos and other inappropriate materials based on renewed risk assessment.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Education: 1. Address the medium term WCED Infrastructure priorities in terms of the R7 billion plus infrastructure backlog as well as the required R1.8 billion maintenance needs per year. 2. Expand school capacity in areas of highest excess demand using various technologies and delivery mechanisms, including school self-builds. Provide classrooms, play equipment and other facilities for the Early Learning phase. 3. Provide access to learning opportunities in the form of new, modern public schools. 4. Inclusive education infrastructure. Develop a range of service delivery facilities to accommodate learners with special needs. 5. Public school infrastructure renewal programme. Upgrade and replace schools of highest risk of critical asset failure. Upgrade and replace schools of highest risk of critical asset failure.	**Education:** 1. Continue to focus on energy efficiency, in respect of the retrofitting of light fittings and other measures to facilitate cost savings for schools. 2. Continue to expand the investment in solar and alternative energy at new schools. Existing schools also retrofitted with solar.	**Education:** 1. Broaden base of public private partnerships and incentivise design and development of new, innovative school products to meet the diverse demand.	**Education:** 1. Leverage broadband capabilities and LAN facilities to provide access to digital learning hubs. 2. All new high schools to be fitted with telecommunication and IT facilities to provide hybrid learning options. At least 3% of new school infrastructure spend will be towards digital capabilities.	**Education:** 1. Hazardous materials removal programme. Address the risk with asbestos and other inappropriate materials based on renewed risk assessment. 2. Continue to invest in water conservation efforts through the provision of water tanks and the feasibility of boreholes at new school facilities.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Social Development: 1. Ongoing management of DOI property partnerships to secure sustainable income streams for social sector projects such as NGOs. Focus likely required on Older Persons facilities and child and youth care centres due to ageing occupation and in-migration. 2. Maintenance and capacity increase where required of WCG Secure Child and Youth Care Centres for children in conflict with the law and children with severe behavioural problems. 3. Continued maintenance of service point infrastructure to sustain customer experience and OHS compliance.	**Social Development:** 1. Assist NGOs using DOI infrastructure with green energy transition to low-emission, energy efficient technology. 2. Continued refinement of energy efficiencies at facilities to reduce costs. 3. Continued refinement of energy efficiencies at service points to reduce costs.	**Social Development:** 1. Scale impact investment in community-led projects (and in green construction, emissions monitoring and sustainable facilities management).	**Social Development:** 1. Ongoing management of partnerships with the private sector using DOI property partnerships to generate income streams for social sector projects.	**Social Development:** 1. Assist NGOs using DOI infrastructure with green building transition to low-emission, energy efficient technology. 2. Shifting to green building, energy efficient principles and clean air initiatives on all new infrastructure work and maintenance at facilities. 3. Shifting to green building principles on all new infrastructure work and maintenance.at service points to ensure access to healthier, more sustainable spaces.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Recreation: 1. Expand Community Arts Centre-Library Model and consolidate in areas where there is existing infrastructure in close proximity. 2. Archives: the new wing or new purpose-built facility for Archives complete. 3. Shared facility: each district must have a functional shared facility which may also include Philippi Stadium. 4. Infrastructure upgrades in line with the new usage model for cultural facilities. 5. New site for the Cape Town Museum – possibly linked to the proposed Hisense Museum.	**Recreation:** 1. Continue to electrify all DCAS facilities with renewables.	**Recreation:** 1. Improve road access to new World Heritage Sites – Cradle of Human Culture. Elands Bay Diepkloof Rockshelter. 2. Procure land adjacent to world heritage site to reduce risk of buffer zone being developed which would compromise status. 3. Design recreational spaces to have dual purposes when possible allowing suitable spaces for heat refuges, emergency shelter and disaster evacuation 4. Enhance and expand affordable eco-tourism offerings in provincial nature reserves.	**Recreation:** 1. Expand digital infrastructure to boost rural resilience – Libraries and Museums as key nodes. 2. Establish digital literacy programmes alongside technology infrastructure rollouts.	**Recreation:** 1. Enhance ecological buffers around World Heritage Sites and increase resilience as per requirements of the Conservation Management Plans. 2. Expand WC Conservation Estate (in line with national Biodiversity targets). 3. Ensure provincial conservation estate is optimally managed and protected whilst enabling citizen access from recreation and spiritual purposes. 4. Plant indigenous trees for shade and heat refuges in and around facilities.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Long-term planning range (15 to 30 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Overall: 1. Finalise equitable access to advanced healthcare, education, and recreation.	**Overall:** 1. Drive energy self-sufficiency in all social facilities.	**Overall:** 1. Embed social infrastructure as a core driver of inclusive growth.	**Overall:** 1. Position the province as a leader in 4IR and 5IR technologies. 2. Build empathetic and inclusive digital ecosystems supporting education, entrepreneurship, and governance.	**Overall:** 1. Build net-positive social infrastructure integrating regenerative design. 2. Scale the biophilic designs best suited to support wellbeing and preventative health practices.
Health: 1. Address the long-term WCGHW Infrastructure priorities in terms of the R40 billion plus infrastructure backlog as well as the required R2 billion maintenance needs per year. The project list is not currently available and will have to align with the population needs beyond 2045.	**Health:** 1. At least 12% of Infrastructure spent will be towards the electrical installations and/or upgrades which is inclusive of renewables and decreased energy usage.	**Health:** 1. Embed social infrastructure as a core driver of inclusive growth.	**Health:** 1. At least 1% of Infrastructure spent will be towards broadband access, telecommunications within WCGHW facilities and in new facilities. 2. Embed telemedicine as part of our health facilities design.	**Health:** 1. Build net-positive social infrastructure integrating regenerative design. 2. Scale the biophilic designs best suited to support wellbeing and preventative health practices.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Long-term planning range (15 to 30 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Education: 1. Address the long term WCED Infrastructure priorities in terms of the R7 billion plus infrastructure backlog as well as the required R1.8 billion maintenance needs per year. 2. Provide access to learning opportunities in the form of new, modern public schools. 3. Public school infrastructure renewal programme. Upgrade and replace schools of highest risk of critical asset failure. Upgrade and refurbish existing facilities to increase functionality.	**Education:** 1. Continue to expand the investment in solar and alternative energy at new schools. Existing schools are also retrofitted to include solar.	**Education:** 1. Broaden base of public private partnerships and incentivise design and development of new, innovative school products to meet the diverse demand.	**Education:** 1. All new schools to be fitted with telecommunication and IT facilities to provide hybrid learning options.	**Education:** 1. Continue the hazardous materials removal programme.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Long-term planning range (15 to 30 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Social Development: 1. Ongoing management of DOI property partnerships to secure sustainable income streams for social sector projects such as NGOs. Focus likely required on Older Persons facilities and child and youth care centres due to ageing occupation and in-migration. 2. Maintenance and capacity increase where required of WCG Secure Child and Youth Care Centres for children in conflict with the law and children with severe behavioural problems. 3. Continued maintenance of service point infrastructure to sustain customer experience and OHS compliance.	**Social Development:** 1. Assist NGO owned facilities with green energy transition.	**Social Development:** 1. Strengthen localised value chains to support long-term community resilience and socio-economic mobility.	**Social Development:** 1. Ongoing management of partnerships with private sector using DOI property partnerships to generate income streams for social sector projects.	**Social Development:** 1. Assist NGO owned facilities with green building transition.

Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities Sector priorities for the Long-term planning range (15 to 30 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Recreation: 1. Further rollout of the Hub Model for DCAS Facilities by consolidating existing and building new infrastructure based on this model for anticipated growth in Garden Route and City of Cape Town. 2. Blombos Museum/ Interpretation Centre in Hessequa Municipality to support the New World Heritage site in Blombos Cave.	**Recreation:** N/A	**Recreation:** 1. Access Road to Blombos Cave. 2. Design recreational spaces to have dual purposes when possible allowing suitable spaces for heat refuges, emergency shelter and disaster evacuation. 3. Enhance and expand affordable eco-tourism offerings in provincial nature reserves.	**Recreation:** N/A	**Recreation:** 1. Expand Conservation Estate in line with national Biodiversity targets. 2. Ensure provincial conservation estate is optimally managed and protected whilst enabling citizen access from recreation and spiritual purposes. 3. Plant indigenous trees for shade and heat refuges in and around facilities.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Local Government: 1. Develop mixed-use urban nodes to enhance access to services and employment opportunities in underserved areas. 2. Upgrade community centers to serve as hubs for disaster preparedness and local engagement.	**Local Government:** **Energy:** 1. Expand renewable energy microgrids in peri-urban and rural areas to improve resilience. 2. Retrofit municipal buildings for energy efficiency, including solar PV and energy-saving technologies. **Water:** 3. Upgrade and maintain water infrastructure to ensure reliable supply to growing urban and rural areas. 4. Implement water demand management programmes to reduce consumption and wastage. 5. Develop decentralised water treatment systems for underserved communities. **Wastewater:** 1. Upgrade wastewater treatment plants to meet environmental compliance standards. 2. Implement decentralised wastewater treatment systems.	**Local Government:** 1. Incentivise public-private partnerships to fund infrastructure projects in marginalised communities. 2. Develop local labour programmes tied to infrastructure upgrades to boost employment and skills transfer. 3. Establish waste recovery and alternative waste infrastructure to facilitate recovery, recycling of recyclable material for stimulating the circular economy.	**Local Government:** 1. Implement GIS-based planning tools to map and monitor spatial vulnerabilities. 2. Expand broadband infrastructure to rural areas to support e-governance and local economic development.	**Local Government:** 1. Prioritise green infrastructure projects such as urban greening and stormwater management systems. 2. Protect critical ecological zones by integrating them into relevant environmental and spatial planning frameworks. 3. Support development of Ecological Infrastructure Plans for Funding and Implementation. 4. Implement Disaster Risk Reduction Programmes.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
	Wastewater: 3. Enhance sewerage network resilience to mitigate pollution risks. **Roads & Stormwater:** 1. Repair and upgrade municipal road networks to improve connectivity and accessibility. 2. Implement advanced stormwater management systems to mitigate flooding risks. 3. Prioritise sustainable road construction materials and designs to reduce maintenance needs and incorporate water sensitive design. **Solid waste:** 1. Develop public awareness campaigns to encourage waste reduction and segregation. 2. Upgrade municipal waste collection systems to improve efficiency and coverage. 3. Establish recycling and composting programmes to reduce waste sent to landfills			

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience

Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
Environmental Affairs & Development Planning: 1. Environmental system risks and vulnerabilities monitored, and trends reported into WCG new site selection and extant infrastructure upgrade/maintenance planning. 2. Inclusion of implementation of water sensitive design principles in municipal (building/ development) by-laws. 3. Coastal recreational public facilities are restored and maintained to support recreational and economic activities.	**Environmental Affairs & Development Planning:** **Energy:** 1. Support prioritisation of lower carbon energy generation and distribution, including green hydrogen). 2. Support energy access to informal and underserved settlements, with a focus on renewable energy sources. 3. Implement WC Climate Change Response Strategy for Net-Zero Emissions by 2050. **Water:** 1. Inform and support the sustainable infrastructure projects to reduce pollution and improve water management in key urban areas.	**Environmental Affairs & Development Planning:** 1. Spatial development planning -to enable alignment of transport planning with climate resilient. 2. Set infrastructure performance standards for resource efficiency in the transport sector. 3. Small Harbours are prioritised for repair & maintenance. Upgrading programme commences. Boat launching sites are maintained and support sustainable coastal livelihoods. 4. Identify and prioritise 2 spatial rejuvenation "Rural cities". [**See footnote**] 5. Identify and design "ruralisation initiatives" to catalyse growth and divert resource flows and opportunities into towns and urban edges (e.g. freight village from PLTF).	**Environmental Affairs & Development Planning:** 1. All WCG EI investments track and report progress using a common framework that, in turn, can aggregate indicators for strategic-level reporting. 2. Conduct area-wide fine scale flood risk modelling beginning with the priority catchments identified in the EIIF with PDMC to inform infrastructure planning. 3. Review mobile pyrolysis technologies to convert biomass to energy/biochar or other useful products (e.g., invasive species). 4. Spatially map various environmental authorisations (from 2018 onwards) and conceptualise a platform for submission, tracking and spatial mapping of environmental applications for ease of doing business/ decision-support.	**Environmental Affairs & Development Planning:** 1. By 2030 there is significant improvement in investment in EI projects across the province, by both the public and private sectors compared to the baseline. 2. By 2030 ecological infrastructure is progressively incorporated into WCG planning, municipal IDPs, SDFs and Environmental Management Frameworks in order to guide future investment, including knowledge sharing across institutions. 3. Facilitate the development of blended finance schemes for investment in EI.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience

Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
4. Identify high-risk areas affecting informal settlements. 5. Use the Conservation Estate in the Province as a recreational asset. 6. Ensure provincial conservation estate is optimally managed and protected while enabling citizen access from recreation and spiritual purposes.	**Waste:** 1. Update report on waste-infrastructure requirements and apply for funding to address the backlog of waste management infrastructure in order to improve compliance and progress from waste management to circular economy.	6. Support spatial transformation and resilience with targeted infrastructure investment, through the development of the spatial investment decision support framework as part of the WC SDF. 7. Advance institutionalisation of regional spatial governance and operationalise RPG-TWG work streams [Including to facilitate coordinated regional spatial planning within priority areas, such as the Greater Cape Town Region]. 8. Ensure a functional spatial planning and land use management governance system in all Western Cape Municipalities (responsive, spatially transformative and socially equitable MSDFs and land use management systems).	5. Identify systems/technology used for submission of regulatory applications at National, Provincial and Local level (i.e. environmental, planning, heritage, agriculture, water, waste, payment of development contributions, etc.), and investigate mechanisms that could be implemented to link various systems at National, Provincial and Local level in order to facilitate regulatory approvals and tracking thereof. 6. Spatial Mapping of Project Pipelines: Collaboration between DEA&DP and DoI to spatially map departmental project pipelines and RAMPs/UAMPs, etc. Also vs. project readiness (incl. land acquisition, regulatory approvals, etc.) as a pro-active delivery support action. [requires departments to geotag their budgets and projects.	4. Environmental Management Frameworks to be developed and adopted identifying environmental sensitivities (such development potential and no-go areas); subject to funding. This can relate to applicability of EIA activities. 5. Facilitate the development of sustainable settlements (and the expansion or existing settlements) through environmental planning - to proactively identify (un)suitable areas for human settlement development. 1-5 years: focus on priority areas/ towns; 5-10 years: focus on other areas/towns.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience

Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
		9. Affirm CEF Methodology & Upscale CEF Support Programme to WC municipalities and recognise work under RPG-TWG Workstream 4 (DEA&DP, DoI, DLG). [Ensure all local municipalities develop a 10-year prioritised portfolio of capital investments required, as a means to facilitate spatial transformation and improve spatial resilience, i.e. a Capital Expenditure Framework]. 10. Enable the delivery of functional and affordable housing markets in the Western Cape through the implementation of various mechanisms such as Municipal Housing Market Studies, Inclusionary Housing and Affordable Housing Policies, Incentive Policies, etc. 11. Implement WC Climate Change Response Strategy for Net-Zero Emissions by 2050. 12. Embed the principles for infrastructure procurement by the United Nations in Sustainable Public Procurement, and to determine approach ways of tracking and defining such procurement.	7. Collaborate with DoI / PT / PDO with start of work to develop integrated infrastructure planning data systems with transparent information systems and data sharing for the development and monitoring of the Provincial Infrastructure pipeline. 8. Facilitate the development of sustainable settlements (and the expansion or existing settlements) through environmental planning - to proactively identify (un) suitable areas for human settlement development. 1-5 years: focus on priority areas/ towns; 5-10 years: focus on other areas/towns. 9. Implement WC Climate Change Response Strategy for Net-Zero Emissions by 2050.	

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience

Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
G4J Implementation Plan: 1. Improved logistics and mobility. ▸ Seek devolution of the PRASA Metrorail function and the development of PPP concession approaches to public transport development using innovative value capture mechanisms and mixed-use densification to enhance the viability of transport corridors and reduce transport costs. ▸ Introduce new mobility solutions and/or positively impact spatial patterns to reduce time spent commuting, including transit-orientated developments as well as non-motorised transport models.	**G4J Implementation Plan:** 1. Improve Energy Resilience and Promote Low-Carbon Investment. ▸ Make government land available for utility-scale energy generation and storage, with pre-approved regulatory and EIA requirements. 2. Low Carbon Energy Generation, Procurement, and Trading. ▸ Support infrastructure needs for renewable energy and economic growth. ▸ Implement Solar PV programmes in schools and WCG buildings to reduce costs, mitigate load shedding, and add MW to the grid. ▸ Support public sector energy projects with PV and storage. ▸ Facilitate feasible gas power options. ▸ Develop utility-scale BESS and pumped hydro systems for energy storage.	**G4J Implementation Plan:** 1. Increase Public sector infrastructure investment to R34.3 billion (in real terms)/ Develop Future-fit public sector infrastructure investment that creates value, builds trust, optimises resources, enables connectivity, and catalyses economic growth. 2. Develop a R200 billion infrastructure pipeline of bankable future-fit WC projects ready for execution, and 1 pipeline mega-project to be implemented. 3. Create an enabling and competitive environment through supporting economic development infrastructure interventions. ▸ Leverage government assets and buildings for economic development activities. ▸ Develop pilots and models for private-public collaboration. ▸ Promote and enable Catalytic Infrastructure and/or growth opportunity hubs to help catalyse opportunities and improve ease of doing business.	**G4J Implementation Plan:** 1. Strengthen Ease of Doing Business and Promote Innovation. ▸ Establish a sandbox for emerging technologies to test, prototype, and commercialise innovations with rapid regulatory shifts. 2. Establish Economic Accelerator and Tech Hubs. ▸ Create physical hubs to attract and pool investment in digital, technology, and innovation start-ups. 3. Support Human Capital Development. ▸ Deploy WCG land and assets for post-school education facilities. ▸ Intensify wireless hotspot connectivity in communities. ▸ Address ease-of-doing business with respect to access to way leaves, with a view to proactively incorporating the necessary fibre ducts to maintain road infrastructure integrity but also as a possible revenue source for municipalities.	**G4J Implementation Plan:** 1. Improve Water Demand and Supply Management. ▸ Using the water supply value chain, identify leverage points, including water re-use, stormwater utilisation, and new supply schemes. ▸ Optimise water supply at source through ecological rehabilitation and alien vegetation removal. ▸ Monitor groundwater quality and abstraction to ensure aquifer recharge. 2. Enhance Infrastructure Maintenance. ▸ Expand smart water systems for better monitoring and data collection. ▸ Prioritise maintenance of waterways and canals to maximise supply and minimise leakage.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
	3. Maintain and Expand Energy Infrastructure. ‣ Protect energy infrastructure from vandalism and theft. ‣ Upgrade transmission and distribution infrastructure through partnerships to enable large-scale renewable energy. ‣ Explore nano or localised micro grids for community and industrial resilience. 4. Implement WC Climate Change Response Strategy for Net-Zero Emissions.	4. Develop new infrastructure that is climate resilient and enable (including finance the reconstruction of infrastructure damaged by climate change-related events. 5. Unlock enabling and competitive logistics and export infrastructure. ‣ Improve freight logistics through unlocking the effectiveness, efficiency and competitiveness of the Western Cape logistics value chain (enhanced with technological solutions). ‣ Expand the Air Access Initiative for better connectivity to Africa and other parts of the world. ‣ Enhance supportive compliance infrastructure and regulations and ensure linkages with the energy and resilience PFA to reduce the province's carbon footprint and address anticipated carbon border adjustment (CBA) barriers in target export countries).	‣ Accelerate the rollout of Digital Access Centres and make more effective use of Western Cape Government and municipal infrastructure to align better with new 4IR developments and skills acquisition trends.	3. Coordinate Water Infrastructure Oversight and Investment ‣ Undertake coordinated water governance planning and decision-making for improved supply options and source diversification. ‣ Collaborate on water infrastructure investment, including funding for smaller municipalities and public-private partnerships. ‣ Fund regional water innovation hubs for developing water solutions.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
	5 Foster Energy Generation, Procurement, and Trading. ‣ Develop the Western Cape Just Energy Transition (JET) Investment Plan, remove regulatory constraints, and access global climate finance. ‣ Establish a project preparation facility for bankable projects. ‣ Support municipal IPP procurement. ‣ Plan for green hydrogen production and necessary infrastructure for exports. ‣ Enable electric vehicle adoption and infrastructure. ‣ Encourage biofuel blending and green energy production from gas. 6. Develop a Western Cape Integrated Resource Plan.	6. Unlock planning coordination, ecosystems, ease-of-doing government and technology to ensure that infrastructure capacity can cope with and support projected economic growth. ‣ Align planning units of economic cluster departments, municipalities and infrastructure implementers, and establishing a provincial multi-sectoral infrastructure planning and coordination committee. ‣ Develop an AI and predictive analytics enabled technology platform to model the optimal supply and demand for infrastructure, making planning, implementation and management visible in real time. ‣ Build the capacity and capability of municipal officials. ‣ Strengthen the ecosystems between government and the private sector along and across various infrastructure verticals or themes, such as public transport and housing.	*Comment: We have an installed base of 6 hyperscale data centres in the Cape Town metro already. Others are planned for just outside the metro. The companies involved are very strong on reduced energy consumption.* *For example, Amazon has pioneered wheeling of renewable energy.* *https://aiimafrica.com/media/media-centre/nersa-approves-flagship-energy-wheeling-project-for-amazon/* *Teraco has the stated aim of 50% of their energy consumption supplied from clean sources by 2027 and 100% by 2035 (https://www.teraco.co.za/about/sustainability/environment/)* *Africa Data Centres itself has a target to power all its data centres with clean, zero-carbon sources of energy.*	4. Develop Ecological Infrastructure. ‣ Create management plans for municipalities, information monitoring tools, and invasive alien plant clearing. ‣ Develop ecological infrastructure for agriculture.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		▸ Develop innovative, sustainable funding models and instruments for infrastructure, institutional coalition models, private-public partnerships and outcome-based procurement. ▸ Review infrastructure-related legislation and regulations with the aim of providing evidence-based advocacy for legislative and regulatory change to align better to South Africa's context and circumstances. ▸ Establish a regulatory sandbox to allow for the exploration of innovative techniques, models, testing materials and infrastructure solutions ▸ Strengthen the regional pipeline of apprenticeships and semi-skilled labour through expanding contracted in-house capacity, coupled with intensive in-house skills training, within the Department of Infrastructure to address maintenance management and infrastructure backlogs and, more importantly, to broaden the skills pool for the private sector.		

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		7. Infrastructure as a catalyst for targeted economic growth opportunities in townships, rural areas and urban fringes. ▸ Drive spatial transformation and economic accessibility by identifying private-sector and community-led models for business infrastructure (commercial, retail, and light industrial) in townships, which includes community-intensive, women-sensitive build and operations.. ▸ Initiate one or two pilot project township initiatives using all-of-society approaches and principles in planning and implementation ▸ Explore the development of high street models or hybrid centralised and decentralised models for townships, leveraging off existing business activities and in cooperation with the communities. Work with national government to support and address the lack of tenure and title deeds within township communities, as solutions to this challenge will have a transformative impact on households.		

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		▸ Identify unutilised and under-utilised Western Cape Government buildings and land that can be deployed as an accelerator for targeted growth opportunities. ▸ Establish 'business hubs' that are responsive to private-sector-led needs and will be driven by the private sector. ▸ Support and strengthen approaches to urban planning, design and development (together with the municipality of Stellenbosch and the Cape Town metro) in order to support economic activity and growth that is inclusive of the principles of the Growth for Jobs Strategy. ▸ Drive spatial transformation through enabling and fast-tracking housing development for mixed use and mixed income through land release mechanisms for well-located land near economic activities as well as through the support of economic growth opportunities closer to where communities are located.		

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		Note PFA 7: Improved Access to Economic Opportunities and Employability (skills and education, transport, housing, etc.) outcomes and change strategies/priorities are captured under WCIS 2050 Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities. Note relevance of some priorities for Outcome 4 mobility and transportation corridors.		

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Agriculture: 1. Housing opportunities for agri-workers. 2. Accessible health care for rural and farming communities (mobile clinic service). 3. Adequate community-based care and support services for rural and farming communities. 4. Adequate Cultural, recreational and sport facilities in rural and farming communities. 5. Maintenance and upgrades at the 4 decentralised agricultural training centres in Bredasdorp, Oudtshoorn, George and Clanwilliam and at the main campus at Elsenburg.	**Agriculture:** 1. Have a full energy balance report available for all rural municipalities. 2. Remove the most critical energy limitations to agricultural and agri-processing development (e.g. in certain areas of the Witzenberg area line limitations prevent investment). 3. A network of charging stations (not further than 200km from the next) for vehicles across the province in place on all main routes. These charging stations should be from renewable resources.	**Agriculture:** 1. Remove inefficiencies in the port of Cape Town to the extent that there is no limitation on the export of perishable products. 2. A feasibility study of the lengthening of the runway at George airport completed. The purpose is to accommodate wide-body aircraft. 3. Feasibility study of cooling / packing facilities at George airport completed. 4. A feasibility study completed on the freight handling export capacity of Mossel Bay harbour. 5. Problems with issuing of licenses for gravel pits adequately addressed. 6. Rural roads adequately maintained – to the level of transport of delicate agricultural products - on a regular basis.	**Agriculture:** Approach: We aim to integrate cutting-edge technology, combining tractors, sensors, telecommunications, and traditional farming equipment with big data analytics, data services, secure backups, machine learning, and AI, creating a seamless agricultural ecosystem that enhances productivity, optimises resource use, and drives sustainable growth through intelligent, data-driven decision-making for short-, medium- and long-term planning. Therefore, many of the below have a carry-through effect to the medium- and long-term. 1. Investigate and implement a stable hybrid telecommunication system at acceptable bandwidth, i.e., the most efficient combination of data communication within rural Western Cape (for decentralisation the combination of broadband, fibre, satellite – not one, but all).	**Agriculture:** 1. Water balance study for the Breede River catchment area completed. 2. Alien clearing in watercourses remains a priority project and different cooperation models are compared. 3. Additional water resources and extractable volumes for agricultural use identified (e.g. Buffelsjag, Zonderend River, Southern Cape rivers. 4. Urban planning regulations make the installation of capturing rainwater mandatory. 5. Urban planning regulations make provision for adequate space for urban farming / community food gardens.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		7. Pilot project of public transport in rural farming areas operational. 8. Use of rail to transport perishable products to the port of Cape Town is a viable option for farmers. 9. Adequate rail infrastructure and rolling stock available to transport grain from silos to the end-user.	2. Investigate and implement various sensors (Internet of Things (IOT)* and non-communicative) for animals, plants, GIS and climate change. 3. Automated instruments, e.g., drones and farming implements. 4. Investigate Artificial Intelligence (AI), Machine learning and the required hardware to run these applications (local and cloud-based.	

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Local Government: 1. Develop integrated housing and transportation projects in alignment with spatial development frameworks. 2. Expand multi-functional community hubs in strategic areas for social cohesion and service access.	**Local Government:** **Energy:** 1. Transition municipal fleets and critical services to renewable energy sources. 2. Expand the regional energy grid to support growing urban centers and improve grid stability. **Water:** 1. Expand regional water storage and distribution systems to meet projected demand. 2. Invest in advanced water treatment technologies to improve water quality. 3. Enhance catchment management programmes to protect water resources. **Wastewater:** 1. Expand capacity of regional wastewater treatment facilities to support urban growth. 2. Introduce advanced wastewater recycling and reuse systems. 3. Implement real-time monitoring systems for wastewater infrastructure to improve efficiency.	**Local Government:** 1. Foster innovation districts within growth areas to attract investment and skilled labour. 2. Encourage small and medium enterprises (SMEs) through infrastructure support in designated development zones. 3. Implement Disaster Risk Reduction Programmes and ensure Disaster Preparedness by Districts and Municipalities.	**Local Government:** 1. Roll out smart-city technologies in urban centers to optimise energy use, mobility, and public safety. 2. Establish a regional database to track the performance and impact of infrastructure investments.	**Local Government:** 1. Enhance resilience by integrating climate adaptation measures into new and existing infrastructure. 2. Establish ecological corridors to connect urban spaces with natural habitats and support biodiversity. 3. Support development of Ecological Infrastructure Plans for Funding and Implementation.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
	Roads & Stormwater: 1. Expand municipal road networks to accommodate urban growth and improve connectivity. 2. Develop integrated stormwater and drainage systems in flood-prone areas. 3. Implement smart road technologies to enhance traffic management and road safety. **Solid waste:** 4. Promote the development of circular economy initiatives to enhance waste resource recovery. 5. Implement waste-to-energy technologies to reduce landfill dependency and generate renewable energy. 6. Construct regional waste management facilities, including material recovery facilities (MRFs).			

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Environmental Affairs & Development Planning: 1. Support the development of social infrastructure which is able to serve multiple functions including as evacuation centres and climate extreme refuges. 2. Develop a prioritised action/management plan to address high-risk areas in informal settlements. 3. Promote active mobility infrastructure (bike lanes and pedestrian pathways) to reduce vehicle emissions.	**Environmental Affairs & Development Planning:** 1. Support prioritisation of lower carbon energy generation and distribution (including green hydrogen). 2. Implement WC Climate Change Response Strategy for Net-Zero Emissions. 3. Monitor air quality and track pollution levels to ensure that air quality remains good despite climate related intensity of heat islands and inversion layers.	**Environmental Affairs & Development Planning:** 1. Economic impact of extreme weather events, especially how drought is managed and the needs for water security interventions and infrastructure maintenance. 2. Regional planning is embedded as strategic spatial governance, supported by shared frameworks (such as the Greater Cape Town Regional Study) that better align efforts. [Collaboration is sustained, partnerships are trust-based, and joint learning is continuous, enabling stakeholders to collaboratively shape regional growth and development]. 3. e-Waste material recovery infrastructure / facility option identified and commissioned. 4. Evaluate the existing spatial planning and land use management governance system for responsive, spatially transformative and socially equitable MSDFs, CEFs and land use / development decision-making.	**Environmental Affairs & Development Planning:** 1. The impacts of climate change on informal markets and the establishment of appropriate infrastructure options / technologies for these facilities are considered. 2. Identify key spatial data and data gaps that must be addressed in order to develop a GIS-based tool that could be used to identify possible regulatory triggers for a single or pipeline of projects. 3. Implement technological solutions identified in Years 1-5 to streamline regulatory applications, approvals and tracking. 4. Integrated system developed to monitor multi landowner catchment management (incl. invasive alien plant clearing, river maintenance etc) and streamflow to determine built infrastructure de-risk requirements.	**Environmental Affairs & Development Planning:** Undertake a review of existing EI frameworks and policy to reflect priorities up to and including 2040. Sustainable Water Protection Plan is up to date and guides resource allocations for water quality and Streamflow Reduction Activity management. 1. By 2040 the EI of the Western Cape is more resilient, compared to the baseline. Extent of invasive alien plants is significantly reduced from its 2023 baseline. 2. Improved vulnerable groups' involvement in, and access to, sustainable benefits that flow from EI investment and management.

[2]Consider the informal economy and how we consider the impacts of climate change on informal markets and the establishment of appropriate infrastructure options / technologies for these facilities are considered. E.g. how will informal food vendors deal with increasing temperatures (food waste and health and safety considerations).

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		5. Support the delivery of inclusionary, spatially transformative and equitable housing in the Western Cape, e.g. through development of an inclusionary housing zoning policy) or more. 6. Implement WC Climate Change Response Strategy for Net-Zero Emissions.	5. By 2040, the impact of EI investment on the modelled damage to infrastructure that would likely have occurred prior to EI investment and the associated losses is tracked and reported on annually (i.e., savings arising from disaster risk reduction associated with EI investment). 6. Implement WC Climate Change Response Strategy for Net-Zero Emissions. 7. Air quality is comprehensively monitored in the province using an integrated online system with real-time data analytics to mitigate pollution and improve air quality management.	3. Implement ecological infrastructure solutions in high-risk areas supporting water and soil conservation.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience

Sector priorities for the Medium-term planning range (5 to 15 years)

Social	Energy & Water	Economic	Technology	Ecological
G4J Implementation Plan: 1. Improved logistics and mobility. ‣ Seek devolution of the PRASA Metrorail function and the development of PPP concession approaches to public transport development using innovative value capture mechanisms and mixed-use densification to enhance the viability of transport corridors and reduce transport costs. ‣ Introduce new mobility solutions and/or positively impact spatial patterns to reduce time spent commuting, including transit-orientated developments as well as non-motorised transport models.	**G4J Implementation Plan:** 1. Improve Energy Resilience and Promote Low-Carbon Investment. ‣ Make government land available for utility-scale energy generation and storage, with pre-approved regulatory and EIA requirements. 2. Low Carbon Energy Generation, Procurement, and Trading. ‣ Support infrastructure needs for renewable energy and economic growth. ‣ Implement Solar PV programmes in schools and WCG buildings to reduce costs, mitigate load shedding, and add MW to the grid. ‣ Support public sector energy projects with PV and storage. ‣ Facilitate feasible gas power options. ‣ Develop utility-scale BESS and pumped hydro systems for energy storage.	**G4J Implementation Plan:** 1. The Western Cape economy has the infrastructure required to support and enable a R1-trillion economy and public sector capital investment in the Western Cape will be 10% of regional GDP by 2035. 2. Private-sector investment will be 20% of regional GDP (translating to R200 billion) by 2035. 3. Create an enabling and competitive environment through supporting economic development infrastructure interventions. ‣ Leverage government assets and buildings for economic development activities ‣ Develop pilots and models for private-public collaboration. ‣ Promote and enable Catalytic Infrastructure and/or growth opportunity hub to help catalyse opportunities and improve ease of doing business. 4. Develop new infrastructure that is climate resilient and enable (including finance) the reconstruction of infrastructure damaged by climate change-related events.	**G4J Implementation Plan:** 1. Strengthen Ease of Doing Business and Promote Innovation. ‣ Establish a sandbox for emerging technologies to test, prototype, and commercialise innovations with rapid regulatory shifts. 2. Establish Economic Accelerator and Tech Hubs. ‣ Create physical hubs to attract and pool investment in digital, technology, and innovation start-ups.	**G4J Implementation Plan:** 1. Improve Water Demand and Supply Management. ‣ Using the water supply value chain, identify leverage points, including water reuse, stormwater utilisation, and new supply schemes. ‣ Optimise water supply at source through ecological rehabilitation and alien vegetation removal. ‣ Monitor groundwater quality and abstraction to ensure aquifer recharge. 2. Enhance Infrastructure Maintenance. ‣ Expand smart water systems for better monitoring and data collection. ‣ Prioritise maintenance of waterways and canals to maximise supply and minimise leakage.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience

Sector priorities for the Medium-term planning range (5 to 15 years)

Social	Energy & Water	Economic	Technology	Ecological
	3. Maintain and Expand Energy Infrastructure. ‣ Protect energy infrastructure from vandalism and theft. ‣ Upgrade transmission and distribution infrastructure through partnerships to enable large-scale renewable energy. ‣ Explore nano or localised micro grids for community and industrial resilience. 3. Implement WC Climate Change Response Strategy for Net-Zero Emissions. 4. Foster Energy Generation, Procurement, and Trading ‣ Develop the Western Cape Just Energy Transition (JET) Investment Plan, remove regulatory constraints, and access global climate finance. ‣ Establish a project preparation facility for bankable projects. ‣ Support municipal IPP procurement.	5. Unlock enabling and competitive logistics and export infrastructure. ‣ Improve freight logistics through unlocking the effectiveness, efficiency and competitiveness of the Western Cape logistics value chain (enhanced with technological solutions). ‣ Expand the Air Access Initiative for better connectivity to Africa and other parts of the world. ‣ Enhance supportive compliance infrastructure and regulations and ensure linkages with the energy and resilience PFA to reduce the province's carbon footprint and address anticipated carbon border adjustment (CBA) barriers in target export countries.) 6. Unlock planning coordination, ecosystems, ease-of-doing government and technology to ensure that infrastructure capacity can cope with and support projected economic growth.	3. Support Human Capital Development. ‣ Deploy WCG land and assets for post-school education facilities ‣ Intensify wireless hotspot connectivity in communities. ‣ Address ease-of-doing business with respect to access to way leaves, with a view to proactively incorporating the necessary fibre ducts to maintain road infrastructure integrity but also as a possible revenue source for municipalities. ‣ Accelerate the rollout of Digital Access Centres and make more effective use of Western Cape Government and municipal infrastructure to align better with new 4IR developments and skills acquisition trends.	3. Coordinate Water Infrastructure Oversight and Investment. 4. Undertake coordinated water governance planning and decision-making for improved supply options and source diversification. 5. Collaborate on water infrastructure investment, including funding for smaller municipalities and public-private partnerships. 6. Fund regional water innovation hubs for developing water solutions. 7. Develop Ecological Infrastructure. ‣ Create management plans for municipalities, information monitoring tools, and invasive alien plant clearing. ‣ Develop ecological infrastructure for agriculture.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
	▸ Plan for green hydrogen production and necessary infrastructure for exports. ▸ Enable electric vehicle adoption and infrastructure. ▸ Encourage biofuel blending and green energy production from gas. 5. Develop a Western Cape Integrated Resource Plan.	▸ Align planning units of economic cluster departments, municipalities and infrastructure implementers, and establishing a provincial multi-sectoral infrastructure planning and coordination committee. ▸ Develop an AI and predictive analytics enabled technology platform to model the optimal supply and demand for infrastructure, making planning, implementation and management visible in real time. ▸ Build the capacity and capability of municipal officials. ▸ Strengthen the ecosystems between government and the private sector along and across various infrastructure verticals or themes, such as public transport and housing. ▸ Develop innovative, sustainable funding models and instruments for infrastructure, institutional coalition models, private-public partnerships and outcome-based procurement. ▸ Review infrastructure-related legislation and regulations with the aim of providing evidence-based advocacy for legislative and regulatory change to align better to South Africa's context and circumstances.		Perhaps reflect on PFA 3: Disaster mitigation and management outcomes.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		▸ Establish a regulatory sandbox to allow for the exploration of innovative techniques, models, testing materials and infrastructure solutions. ▸ Strengthen the regional pipeline of apprenticeships and semi-skilled labour through expanding contracted in-house capacity, coupled with intensive in-house skills training, within the Department of Infrastructure to address maintenance management and infrastructure backlogs and, more importantly, to broaden the skills pool for the private sector. 6. Infrastructure as a catalyst for targeted economic growth opportunities in townships, rural areas and urban fringes. 7. Drive spatial transformation and economic accessibility by identifying private-sector and community-led models for business infrastructure (commercial, retail, and light industrial) in townships, which includes community-intensive, women-sensitive build and operations.		

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		▸ Initiate one or two pilot project township initiatives using all-of-society approaches and principles in planning and implementation. ▸ Explore the development of high street models or hybrid centralised and decentralised models for townships, leveraging off existing business activities and in cooperation with the communities. ▸ Work with national government to support and address the lack of tenure and title deeds within township communities, as solutions to this challenge will have a transformative impact on households. ▸ Identify unutilised and under-utilised WCG buildings and land that can be deployed as an accelerator for targeted growth opportunities. ▸ Establish 'business hubs' that are responsive to private-sector-led needs and will be driven by the private sector.		

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
		▸ Support and strengthen approaches to urban planning, design and development (together with the municipality of Stellenbosch and the Cape Town metro) in order to support economic activity and growth that is inclusive of the principles of the Growth for Jobs Strategy. ▸ Drive spatial transformation through enabling and fast-tracking housing development for mixed use and mixed income through land release mechanisms for well-located land near economic activities as well as through the support of economic growth opportunities closer to where communities are located. Note PFA 7: Improved Access to Economic Opportunities and Employability (skills and education, transport, housing, etc.) outcomes and change strategies/ priorities are captured under WCIS 2050 Outcome 2: Investment in social infrastructure improves access to health, education, social development and recreation opportunities. Note relevance of some priorities for Outcome 4: Mobility and transportation corridors.		

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience

Sector priorities for the Medium-term planning range (5 to 15 years)

Social	Energy & Water	Economic	Technology	Ecological
Agriculture: 1. Housing opportunities for agri-workers. 2. Adequate accessible health care for rural and farming communities (mobile clinic service). 3. Adequate community-based care and support services for rural and farming communities. 4. Adequate cultural, recreational and sport facilities in rural and farming communities. 5. Establishment of a new regional training centre in Beaufort-West. There is a high demand for training in the Central Karoo. The training centre in Oudtshoorn provides services to the whole of the Garden route area resulting in excessive cost when facilitating courses in Beaufort-West.	**Agriculture:** 1. Renewal energy availability is not a limitation to agricultural and agri-processing development in any rural area of the Western Cape Province. 2. A network of charging stations for vehicles across the province in place with no charging station being further than 200 km from the next. These charging stations should be from renewable resources.	**Agriculture:** 1. The Port of Cape Town is at the mean of the global competitiveness index of all ports in the world. 2. Wide-bodied aircraft land regularly at George airport. 3. Cooling / packing facilities at George Airport available. 4. The recommendations of the feasibility study on the freight handling export capacity of Mossel Bay harbour implemented. 5. Rural roads adequately maintained – to the level of transport of delicate agricultural products - on a regular basis. 6. Public transport in rural farming areas is adequately available. 7. Rail is the option of choice for the movement of perishable and non -perishable agricultural products to the points of export or main urban centres.	**Agriculture:** 1. Continuously improve telecommunication technology for increased efficiency and bandwidth. 2. Where viable, investigate and implement, e.g., data telecommunication between different technologies: direct centre communication to autonomous implement (e.g. tractor). 3. Enhance robotica to be linked with IA. 4. Hardware applications: Investigate the use of AI vis a vis Artificial General Intelligence (AGI).	**Agriculture:** 1. Alien clearing in watercourses remains a priority project and different cooperation models compared. 2. Projects implemented to make additional surface water available to farming (e.g. Buffelsja, Zonderend river, Southern Cape rivers). 3. Sufficient space for urban farming / community food gardens available. 4. Captured rainwater and greywater systems regularly used for the irrigation of urban farming / community food garden projects.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience

Sector priorities for the Long-term planning range (15 to 30 years)

Social	Energy & Water	Economic	Technology	Ecological
Local Government: 1. Finalise the integration of equitable spatial access to education, healthcare, and recreation facilities across all communities. 2. Support the establishment of sustainable urban and rural settlements aligned with global resilience standards.	**Local Government:** **Energy:** 1. Achieve energy self-sufficiency through a combination of renewable generation and storage technologies. 2. Develop energy-sharing networks between municipalities to ensure sustainability and resilience. **Water:** 1. Develop and maintain large-scale desalination plants to supplement freshwater supply. 2. Integrate climate-resilient water management systems into urban planning. 3. Ensure universal access to sustainable and clean water sources for all communities. **Wastewater:** 1. Build regional wastewater recycling plants to supplement water supply systems. 2. Implement sustainable sludge management practices to generate renewable energy. 3. Future-proof wastewater systems to adapt to population growth and climate change impacts. 4. Ensure minimum treatment capacity and capability at these plants.	**Local Government:** 1. Embed circular economy principles into urban planning and development strategies. 2. Develop long-term partnerships with international investors for major infrastructure projects.	**Local Government:** 1. Position the province as a leader in spatial intelligence technologies to drive efficient and inclusive infrastructure planning. 2. Develop and implement advanced simulation tools for infrastructure resilience planning.	**Local Government:** 1. Scale net-positive infrastructure practices across the region. 2. Integrate nature-based solutions into all major infrastructure projects to ensure long-term environmental health and resilience.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Long-term planning range (15 to 30 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
	Roads & Stormwater: 1. Develop resilient and sustainable road networks to connect urban and rural areas. 2. Integrate stormwater harvesting into urban designs to enhance water reuse. 3. Future-proof municipal stormwater and road systems against climate change impacts and extreme weather events. **Solid waste:** 1. Develop and enforce stringent regulations to ensure sustainable solid waste management practices. 2. Integrate smart waste management systems for real-time monitoring and optimisation. 3. Achieve zero-waste targets through advanced recycling and resource recovery technologies.			

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience Sector priorities for the Long-term planning range (15 to 30 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Environmental Affairs & Development Planning: 1. Support the development of social infrastructure which is able to serve multiple functions including as evacuation centres and climate extreme refuges.	**Environmental Affairs & Development Planning:** 1. Support prioritisation of lower carbon energy generation and distribution (including green hydrogen). 2. All Waste management is optimised to ensure organic materials and recyclable materials are 100% excluded from landfill. 3. Waste to energy facilities integrated into embedded energy approaches & Waste to energy systems are accessible to municipalities. 4. Circular economy is supported by infrastructure to ensure material reclamation is optimised. 5. Regional landfill sites are operational. 6. Waste is transported by rail where longer haul is required to the regional landfill. 7. Air Quality remains good despite climate related intensity of heat islands and inversion layers. 8. Implement WC Climate Change Response Strategy for Net-Zero Emissions.	**Environmental Affairs & Development Planning:** 1. Strategic spatial governance systems evolve into adaptive co-governance. [Flexible coordination to guide regional change is enabled, and the capacity to tackle complex regional challenges at increasing scales is embedded, ensuring regional resilience in a rapidly changing context]. 2. Circular economy is enabled through supportive infrastructure, operations and management. 3. The 10-year prioritised portfolio of capital investments i.e. the CEF's enables universal access, social equity, embeds EI and is future-proof/ resilient. 4. Implement WC Climate Change Response Strategy for Net-Zero Emissions.	**Environmental Affairs & Development Planning:** 1. Use of IoT to obtain real-time quantification of waste data at weighbridges. 2. Digital & satellite monitoring of key environmental systems is standard practice and early warning systems are ubiquitous for all citizens. 3. Air quality is digitally systematically monitored across the province. 4. Implement WC Climate Change Response Strategy for Net-Zero Emissions.	**Environmental Affairs & Development Planning:** 1. The province enters into maintenance phase associated with the eradication of invasive alien plants. 2. Other priority ecological infrastructure identified, and investment strategies identified to safeguard or augment these ecosystems to sustain or improve resilience and human wellbeing. 3. Resource mobilisation associated with ecological infrastructure is largely derisked and directly coupled to benefit flows. 4. Improved vulnerable groups' involvement in, and access to, sustainable benefits that flow from EI investment and management.

Outcome 3: Infrastructure investment drives spatial transformation and improves spatial resilience
Sector priorities for the Long-term planning range (15 to 30 years)

Social	Energy & Water	Economic	Technology	Ecological
Agriculture: 1. Housing opportunities for agri-workers. 2. Accessible health care for rural and farming communities (mobile clinic service). 3. Community based care and support services for rural and farming communities. 4. Cultural, recreational and sport facilities in rural and farming communities. 5. Infrastructure development where shared spaces for training is the modus operandi. This would be for new areas outside of the main centres in each district municipality.	**Agriculture:** 1. The energy needs of agriculture are regularly (every ten years) evaluated and the necessary infrastructure is put in place.	**Agriculture:** 1. The Port of Cape Town is amongst the top third harbours on the global competitiveness index of all ports in the world. 2. George Airport is routinely used as a point of export for perishable agricultural products.	**Agriculture:** 1. Continuously improve telecommunication technology for increased efficiency and bandwidth. 2. Investigate and implement advanced IA and quantum computing telecommunication systems (immediate direct communications versus current bit-by-bit systems). 3. Sensor technology to be improved and adapted to quantum computing. 4. Seamless integration of AGI with robotica through quantum computing.	**Agriculture:** 1. Alien clearing in watercourses remains a priority project and different cooperation models compared. 2. Sufficient space for urban farming / community food gardens available. 3. Captured rainwater and greywater systems regularly used for the irrigation of urban farming / community food garden projects.

Outcome 4: Mobility systems and transportation corridors provide safe and efficient connectivity to opportunities, services, and facilities
Sector priorities for the Short-term planning range (1 to 5 years)

Social	Energy & Water	Economic	Technology	Ecological
Mobility: 1. Prepare to devolve rail – first step towards restoring rail. 2. Formalise and improve MBT services (e.g. company formation, vehicle tracking, driver registration and training). 3. Improve rural transport. 4. Provide specialised support to learners, jobseekers, and people with disabilities. 5. Improve the quality and extent of NMT infrastructure. 6. Expand bicycle distribution programmes. 7. Improving MBT infrastructure, particularly ranks. 8. Improvement of NMT infrastructure especially in rural areas. 9. Establish road safety coordinating committee.	**Mobility:** 1. Public transport priority measures (e.g. high-occupancy vehicle lanes, park-and-rides). 2. Develop a mobility ecosystem that offers a range of mobility solutions that reduce energy consumption. Examples are Mobility-as-a-Service (GMT E-Hailing service). 3. A Mobility Ecosystem that facilitates growth in the use of the GMT Shuttle service to reduce transport reducing traffic congestion and energy consumption. 4. Establish and commission additional regional hubs to bring GMT vehicles closer to client departments, saving fuel and improving support for NEVs. This will enhance user comfort and eliminate range anxiety with NEVs in rural and semi-rural applications. 5. Evaluate installation of EV charging infrastructure at WCG client sites. 6. Intervention to make waste by rail more pervasive.	**Mobility:** 1. Improve bus services and prepare to expand BRT network. 2. Provide specialised support to learners, jobseekers, and people with disabilities. 3. Revitalisation of rail infrastructure. 4. Freight infrastructure initiatives to support transition from road to rail freight. 5. Investigate an inland port/ container terminal. 6. Evidence-based planning and increased utilisation of the WC FDM™. 7. Increase road freight transport efficiency. 8. Ensure safe and accessible transport systems and scenic routes. 9. Plan and implement improvements to existing road-based access to CTIA and George Airport. 10. Plan and advocated for expanded and specialist air cargo infrastructure at CTIA and George Airport.	**Mobility:** 1. Frictionless Mobility Ecosystem integrated through technology that allows seamless travel options public transport options such as rail, bus and taxi options, enabled by the GMT Integrated Mobility Platform (IMP). 2. Technology that seamlessly integrate MaaS options with the broader Mobility Ecosystem, reducing total travel distance and time. 3. NEV energy requirements modelling to align the transition with availability of renewable energy. 4. Develop and expand the charging network. 5. Establish and refine NEV policies and regulations. 6. Transition public and government fleets. 7. Support the transition of MBTs to NEV. 8. Enhance capability to leverage data and technology for road safety.	**Mobility:** 1. Introduce lower-emission vehicles to PT fleet. 2. Research & development on alternative energy fuels as additional NEVs. 3. Introducing further electrification infrastructure. 4. Road improvement initiatives to limit congestion. 5. Establish further dedicated public transport lanes. 6. Reduce freight demand. 7. Commence planning phase for NEV charging infrastructure. 8. Convert shadeports from nylon netting to hard structures with load bearing capacity. 9. Commence planning phase for renewable energy storage solutions, as well as evaluation of generation options.

Outcome 4: Mobility systems and transportation corridors provide safe and efficient connectivity to opportunities, services, and facilities Sector priorities for the Short-term planning range (1 to 5 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
10. Commence planning for establishment of 3 GMT satellite rental sites to enable improved access to GMT rental fleet for client departments. This will provide improved vehicle accessibility for GMT clients, enhancing the delivery of essential government services.		11. Plan and advocate for appropriate port capacitation and capacitation, with a short-term focus on remedial actions. 12. Design and establishment of a Ports Management Unit. 13. Increase availability of GMT rental pool vehicles, reducing the costs to GMT client departments.	9. Acquire, test and evaluate new technology vehicles as they become available. 10. Utilise current and new technology to improve fleet withdrawal and disposal process.	10. Extension of the existing grey water system at GMT Rusper Street to include Phase 1 bathrooms, reducing reliance on municipal water supply. 11. Commence planning phase for inclusion of additional floor(s) to GMT Rusper Street main parking to reduce the GMT footprint. 12. Improve and strengthen the roof of GMT Rusper Street to provide for PV panels in order for renewable energy harvesting and storage, in line with long-term Net-Zero goals for GMT fleet.

Outcome 4: Mobility systems and transportation corridors provide safe and efficient connectivity to opportunities, services, and facilities Sector priorities for the Medium-term planning range (5 to 15 years)				
Social	**Energy & Water**	**Economic**	**Technology**	**Ecological**
Mobility: 1. Use NEV's to provide energy to remote social infrastructure through vehicle-to-grid energy transfer. 2. Optimise and modernise MBT services (e.g. introduce larger vehicles, scheduled services, cashless payment). 3. Devolve rail. 4. Expand BRT services (e.g. MyCiTi Phase 2A, GO GEORGE Phase 5 and 6). 5. Further expansion of bicycle distribution programmes. 6. Continued expansion of reach of PT network.	**Mobility:** 1. Implement battery swapping technology for public transport to allows improved utilisation of the available renewable energy sources. 2. Implement vehicle to grid charging to provide improved flexibility to cater for fluctuating energy requirements. 3. Expand energy storage capacity at GMT facilities to support expansion of NEVs/EVs into fleet. 4. Increase renewable energy generation capacity, multisource and on standardised template platform.	**Mobility:** 1. Continued revitalisation of rail infrastructure, focusing on bringing entire network back online, including tourist routes. 2. Shift in focus from improvement of individual transport-mode related infrastructure to increased connectivity and integration among transport infrastructure. 3. Infrastructure initiatives to reduce port congestion. 4. Terminal network and intermodal strategy for freight operations. 5. Plan and implement / advocated for expanded multi-modal access to major airports. 6. Following short-term normalisation of PSP in maritime ports, develop and promote more ambitious strategy for WC maritime ports.	**Mobility:** 1. Expand digital payment system to the complete mobility ecosystem to integrate private and public mobility options. 2. Deploy UAV (unmanned aerial vehicles) at scale to perform remote services which currently require vehicles to travel to specific locations. Technology such as telematics, in-vehicle technology to be used. 3. Data sharing through shared mobile driver applications to manage traffic congestion and enabling drivers to avoid congestion. 4. Optimise and modernise MBT services (e.g. introduce larger vehicles, scheduled services, cashless payment). 5. Prepare for modal integration (e.g. aligning fare structures and schedules). 6. Scale NEV adoption across private and public sectors. 7. Support the national government with localisation of NEV manufacturing and/or assembly in the province. 8. Improve local municipal capacity to support NEV initiatives.	**Mobility:** 1. Replace diesel PT vehicles with lower-emission alternatives. 2. Leverage alternative funding for NMT improvements (e.g., climate finance). 3. Establish further dedicated public transport lanes. 4. Implement longer term TDM measures in phased approach. 5. Utilise expanded energy storage to power GMT and related facilities, supply power to national grid. 6. Reduce GMT ICE vehicle fleet to 60% of total fleet.

Outcome 4: Mobility systems and transportation corridors provide safe and efficient connectivity to opportunities, services, and facilities
Sector priorities for the Medium-term planning range (5 to 15 years)

Social	Energy & Water	Economic	Technology	Ecological
Mobility: 7. Increased collaboration and private-sector participation for freight. 8. Integrated coordinated planning for freight. 9. Address safety and security issues for all transport modes.	**Mobility:** 5. Installation of EV charging infrastructure and storage at selected WCG sites.	**Mobility:** 7. Increase availability and access to GMT rental pool vehicles to reduce client department vehicle costs. To be realised in conjunction with the establishment of additional GMT satellite sites.	**Mobility:** 9. All new public and government transport vehicles must be NEV. 10. Continued expansion of electric vehicle infrastructure. 11. Enable the use of international bank cards as a fare medium on public transport. 12. Integrate new technology into the GMT fleet that improves fleet operations, vehicle maintenance, security and personnel safety.	**Mobility:** 7. Install grey water system at all GMT facilities where possible to reduce dependency on municipal water.

Outcome 4: Mobility systems and transportation corridors provide safe and efficient connectivity to opportunities, services, and facilities
Sector priorities for the Long-term planning range (15 to 30 years)

Social	Energy & Water	Economic	Technology	Ecological
Mobility: 1. Restore rail as the backbone of public transport (e.g. increased rolling stock, service frequencies, safety). 2. Monitor incident trends and adjust approaches as needed in terms of road safety.	**Mobility:** 1. Standardise battery technology across vehicle types and brands to expand on battery swapping for increased energy flexibility. 2. Vehicle to grid connectivity to provide flexibility of the availability of renewable energy. 3. Optimised and integrated freight transport. 4. Target conversion of GMT fleet to 90% NEVs/EVs.	**Mobility:** 1. Implementing actionable plans from WCIF 2050 imperatives. 2. Ensure new development is supported by and supportive of public transport and mass freight transport, including airport developments. 3. Continued infrastructure initiatives to reduce port congestion and improve pipeline infrastructure. 4. Further integration of transport-related infrastructure. 5. Implement and support implementation of aerotropolises, if deemed viable. 6. Plan for and implement the infrastructure and systems to support new modes of aviation transport within the land transport system.	**Mobility:** 1. Expand the connected Mobility Ecosystem through deployment of Automated Air Taxi's to reduce travel time and traffic congestion. 2. Deploy autonomous public transport vehicles on fixed routes to expand mobility options. 3. Integrate public transport (e.g. integrated ticketing). 4. Transition all the government fleets to NEVs. 5. Achieve complete NEV penetration in urban public transport areas. 6. Further strengthen charging and energy grid resilience. 7. Continuously monitor and refine NEV strategies, policies and initiatives against mitigation targets. 8. Enable full integration of GMT site and WCG sites with appropriate standard of NEV/EV charging infrastructure.	**Mobility:** 1. Continued efforts to reduce passenger vehicle usage, through TDM. 2. Expansion of TDM measures which are successful. 3. Investigate appropriateness of further Transit-Oriented Development (TOD) measures to reduce travel demands. 4. Reduce dependency on fossil fuel to power GMT facilities by 90%.

7.5 Conclusion

The WCG's strategic planning approach demonstrates a deep commitment to sustainability, resilience and the safeguarding of global public goods (GPGs). The WCIF 2050, WCIS 2050, and WCIIP 2050 collectively emphasise the imperative of placing life-sustaining resources, such as air, water, and soil, at the forefront of all infrastructure decision-making. By aligning with both global imperatives like the SDGs and the NDP, these three artefacts form a powerful synergy that grounds critical provincial infrastructure investments in holistic, future-focused principles.

A central tenet of this approach is the recognition that prioritising infrastructure without properly considering ecological integrity creates a hidden bias toward economic growth at the expense of environmental resilience. Accordingly, the WCG will take steps to balance this bias by integrating "non-negotiable" needs, being water security, food security, energy security, and waste treatment and disposal into every level of planning. This will be articulated through the sector prioritisation matrix, scoring models, and rigorously defined governance gates, to ensure that short-, medium-, and long-term goals remain fundamentally aligned with the ecological realities of a rapidly changing world.

This cohesive design is exemplified in the Panoptic Principles, which guide stakeholders in translating high-level strategies into practical, bankable projects. The gap between policy and implementation will be addressed by ensuring that visionary objectives are grounded in operational processes. This will create an environment where infrastructure investments can thrive while also adhering to stringent sustainability, social equity, and fiscal responsibility standards.

Chapter 8

Infrastructure Investment

8.1 Introductions

The **Infrastructure Futures Scenarios for South Africa** provide several key insights into the evolving nature of infrastructure systems[29]:

- **A Paradigm Shift**: Future infrastructure demands a transformative approach, moving beyond traditional methods to embrace innovative, forward-looking strategies.
- **Infrastructure-as-a-Platform**: Reimagining infrastructure as a platform is essential to drive progress towards achieving the SDGs.
- **Future-Ready, Cross-Sectoral Collaboration**: Effective infrastructure development necessitates collaboration across sectors, fostering systems that are adaptive, resilient, and prepared for the future.
- **Smart Infrastructure by 2050**: By mid-century, infrastructure will integrate advanced technologies seamlessly, evolving beyond simple technological upgrades to become truly "smart".
- **Revitalising Existing Assets**: Modernising and repurposing outdated infrastructure is as critical as creating new facilities, ensuring sustainable and efficient use of resources.
- **Whole-System Thinking**: Recognising the interconnectedness of infrastructure networks with human and ecological systems is vital for a holistic approach to infrastructure planning and management.
- **Community Readiness for Future Technologies**: Preparing communities to engage with and adapt to future technological advancements in infrastructure is a crucial aspect of fostering inclusive development.

All these features have been integrated into the WCIF 2050, alongside additional innovations inspired by a "critical-science-orientation". This approach is essential as the WCG is tasked with framing infrastructure growth and development, crafting coherent delivery strategies, and overseeing programmatic implementation (see WCIF 2050).

The WCIF 2050 adopts a **holistic perspective** on infrastructure, balancing the need for innovative solutions with a strong sensitivity to avoiding undue delays in infrastructure action. This ensures that the WCIF 2050 addresses current challenges and aligns with future demands, fostering sustainable and efficient development.

The integration of social value into infrastructure planning and investment has emerged as a transformative approach to addressing modern societal challenges. Recognised globally, social value aims to maximise the benefits of public expenditure by fostering positive economic, social, and environmental outcomes that align with the unique needs of communities. Legislative milestones, such as the UK's Public Services (Social Value) Act of 2012, have set a precedent for embedding social value into public procurement frameworks. The WCIF 2050 incorporates this approach, ensuring that infrastructure projects deliver efficiency and economic outcomes and enhance societal wellbeing through inclusive and locally relevant interventions.

A systems approach to sustainability and inclusion redefines economic development and growth, emphasising the interplay between qualitative and quantitative improvements in society. While economic growth focuses on expanding output through metrics such as GDP, economic development takes a broader view, prioritising innovation, inclusion, and societal wellbeing. By fostering a balance between market efficiency and government regulation, infrastructure investments need to drive economic growth, sustainable progress, strengthen communities, and reduce inequality.

Moreover, achieving the ambitious goals of the WCIF 2050 requires exploring innovative and alternative financing models for infrastructure development. Traditional funding mechanisms often impose constraints that limit flexibility and development trajectories, particularly in developing nations like South Africa. To address these challenges, the WCIF 2050 and WCIS 2050 draw on emerging global financial architectures, such as those championed by the BRICS+ nations, which promote multipolar financial sovereignty and equitable lending practices. These approaches, blended finance, land value capture, and commercial value capture, enable the mobilisation of private capital while aligning infrastructure investments with the SDGs.

By integrating social value, redefining economic development, and leveraging alternative financing models, the WCIS 2050 offers a holistic strategy for infrastructure planning and investment. This approach ensures that projects meet immediate demands for growth and deliver long-term societal benefits. Through targeted interventions in infrastructure, inclusive economic growth and development, and innovative funding mechanisms, the WCIS 2050 aligns global best practices with local priorities, creating a sustainable and equitable future for all communities in the Western Cape.

8.2 Integrating Social Value into Infrastructure Planning and Investment

Social value has gained significant prominence on global political agendas[11,16,17], exemplified by the UK's Public Services (Social Value) Act of 2012[17]. The concept of social value aims to maximise the impact of public expenditure by ensuring that public funds generate positive economic, social, and environmental outcomes tailored to local contexts. This includes prioritising the procurement of locally sourced products and services. The targeted social value outcomes are illustrated in Figure 1 and are also incorporated in the WCIF 2050, WCIS 2050 and WCIIP 2050.

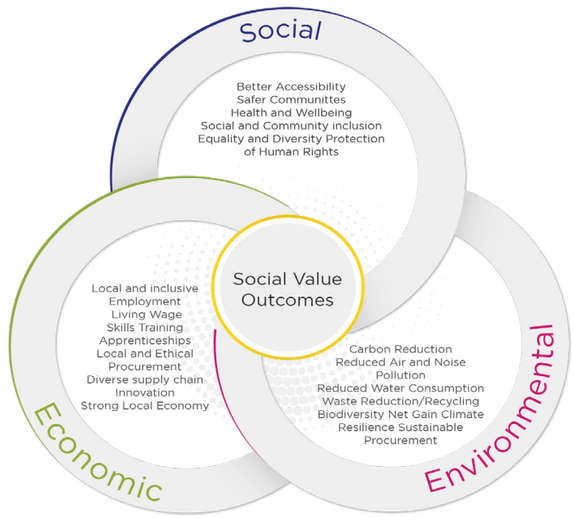


Figure 1: Outcomes of a social value approach

Social value has become a critical consideration in the design, planning, and implementation of projects, with local authorities and public sector bodies playing a central role in driving this shift[11,16,17]. In an era of austerity, where efficiency and cost savings are paramount, social value has become an integral requirement in public procurement contracts. For example, the UK Government introduced a minimum weighting for social value in public sector contracts, aiming for it to account for approximately one-third of all public expenditure. This framework presents significant opportunities for infrastructure investments to deliver measurable social value to communities. Major infrastructure projects, particularly those focused on regeneration, provide a unique chance to uplift marginalised groups by improving their employment prospects

and skill sets, thus integrating them into the labour market. In rural areas, infrastructure development can offer critical access to essential services, improving the quality of life for communities that are often underserved. However, global experience shows that investment decisions are often driven by narrow criteria such as travel time savings or productivity gains, neglecting broader social, health, and environmental benefits. This tendency leads to the approval of project pipelines that overlook important social value outcomes, such as enhanced health, wellbeing, or biodiversity net gains, which should be given equal weight in the decision-making process[11,16,17].

This highlights the critical need for decision-making frameworks and prioritisation models that are aligned with policy ideals and supported by transversal governance across public-private sector value chains. To ensure infrastructure investments deliver maximum societal benefits, it is essential to adopt a holistic, long-term approach to infrastructure development, as outlined in the WCIF 2050. This approach should be proactively supported and enforced to guarantee the integration of emerging global concepts of social value into local infrastructure projects. Given the challenges hindering the widespread adoption of social value, researchers propose several key steps to embed it into decision-making processes[17]: (a) integrate the six capitals of King IV[18], which empower organisations to make decisions that deliver long-term community benefits, moving beyond simple value-for-money assessments; (b) ensure that infrastructure solutions address the real need and not a perceived need (e.g. moving people vs moving cars or energy security vs energy access); (c) embed social value into the core of infrastructure strategies; (d) foster strong, collaborative partnerships; and (e) establish robust feedback mechanisms to measure and monitor performance, ensuring ongoing accountability and improvement.

DEVELOP A SOCIAL VALUE STRATEGY

The social value of future infrastructure projects and programmes can be maximised by prioritising whole-life benefits for infrastructure users and wider society alongside cost considerations where feasible. An outcomes-focused strategy will set out the overarching priorities of most importance over the long-term.

IDENTIFY AND PRIORITISE LOCAL NEEDS

It is essential to align social value with the specific needs, priorities and opportunities of the local community. Defining what social value actually means to a local area is the first step towards delivering and evidencing such value. Working with local stakeholders to deliver updates and providing opportunities to receive community feedback at all stages of an infrastructure project will greatly increase the chances of success. Mapping out the local stakeholders and engaging with them early on in the process also provides first-hand insight into the issues in the area.

ESTABLISH STRONG PARTNERSHIPS

The ability to partner with businesses and charities and tap into innovative sources of funding might allow organisations to tackle projects they could not deliver alone. The complex nature of the issues involved also means that maximising social value is best addressed through establishing strong, cross-sector, long-term partnerships where priorities are aligned. For the supply chain, this requires a willingness for greater collaboration if significant social value is to be delivered.

MEASURE AND MONITOR PERFORMANCE

In order for the potential benefits of a social value approach to be successfully delivered, there needs to be a consistent approach to measuring, monitoring and reporting social value outcomes. It is important that the economic, social and environmental aspects are captured using key performance indicators where possible. Consistent reporting and benchmarking of social value performance will allow organisations to identify both intended and unexpected outcomes, share good practice, and identify what works best. In the UK, the National Social Value Taskforce was set up in 2016 to encourage the effective implementation of the Social Value Act. It established a National Themes, Outcomes and Measures (TOMS) Framework for Measuring Social Value which provides a minimum reporting standard for measuring social value outcomes. Establishing a prioritised set of metrics will help indicate the extent to which these outcomes are realised.

Figure 2: Key aspects to embed social value[17]

Social infrastructure plays a vital role in advancing the levelling-up agenda in local areas[11,16,17]. It creates institutions and physical spaces that nurture personal relationships, civic engagement, and social networks, ultimately leading to more cohesive and healthier communities[12-24]. Research indicates significant potential for well-targeted interventions to enhance social infrastructure, with substantial returns on investment. Studies suggest that for every £1 million invested in social infrastructure[11], there is a return of £2 million in economic and social benefits, along with an additional £1.2 million in fiscal benefits (as illustrated in Figure 3). These figures highlight the transformative impact that social infrastructure investments can have on both local communities and broader societal wellbeing.

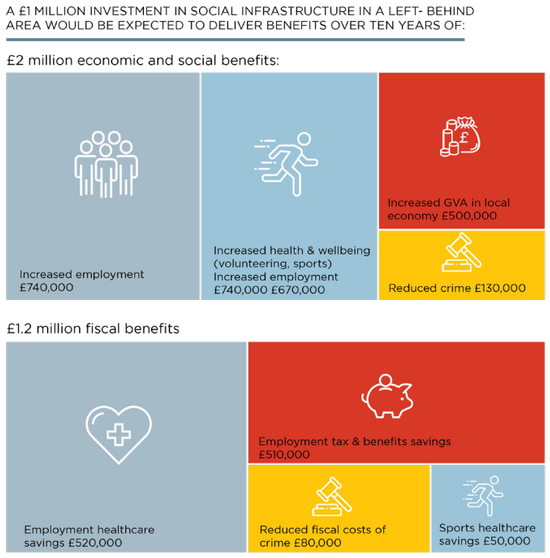


Figure 3: Social infrastructure investment yields to partners and communities[11]

Importantly, the non-monetised benefits of social infrastructure further amplify its investment[11] potential, even though the financial returns outlined in Figure 2 are already compelling. These non-monetary benefits address significant disparities in social infrastructure across local areas, which often constrain opportunities for community development. By investing in diverse social infrastructure projects, communities can bridge these gaps, fostering connections that unite different groups[15]. This, in turn, strengthens shared civic life through institutions and physical spaces that nurture personal relationships, civic engagement, and social networks. The result is a more cohesive and healthier society[12-14], where the benefits extend beyond financial measures to create lasting social value.

The research further defines social infrastructure as the types of investments that a local community can realistically support, encompassing three key dimensions[11]: (a) **Places and spaces** – physical locations within a community where people can gather, such as community hubs, community-owned assets, local shops, social centres, sports clubs, arts centres, heritage spaces, and green spaces; (b) **Community organisations** – local groups that provide services and facilitate social cohesion, including voluntary organisations, charities, neighbourhood forums, local business groups, and social enterprises; and (c) **Connectedness** – both physical and digital connections that enable interaction and mobility within and between communities, such as online communication platforms, digital skills initiatives, community transport systems, transport links to workplaces, and walking/cycling infrastructure. These dimensions collectively contribute to the development of resilient, inclusive, and connected communities.

Social infrastructure

Figure 4: Community connections and relations

Figure 5 highlights the critical role of community-led social infrastructure investments in fostering social capital, which in turn drives a range of positive outcomes across social, economic, fiscal, and environmental dimensions. Investments in places and spaces, community organisations, and connectedness create social bonds and networks, which enhance community cohesion and wellbeing. These investments also boost local economic performance by improving physical, human, and natural capital, leading to higher productivity, employment, and wages. Additionally, such investments contribute to fiscal benefits through increased taxes and reduced service costs, while promoting environmental benefits like reduced emissions and enhanced biodiversity.

Figure 5 emphasises the importance of complementary investments and policies that support these outcomes, creating a sustainable and resilient community infrastructure that delivers long-term benefits to society.

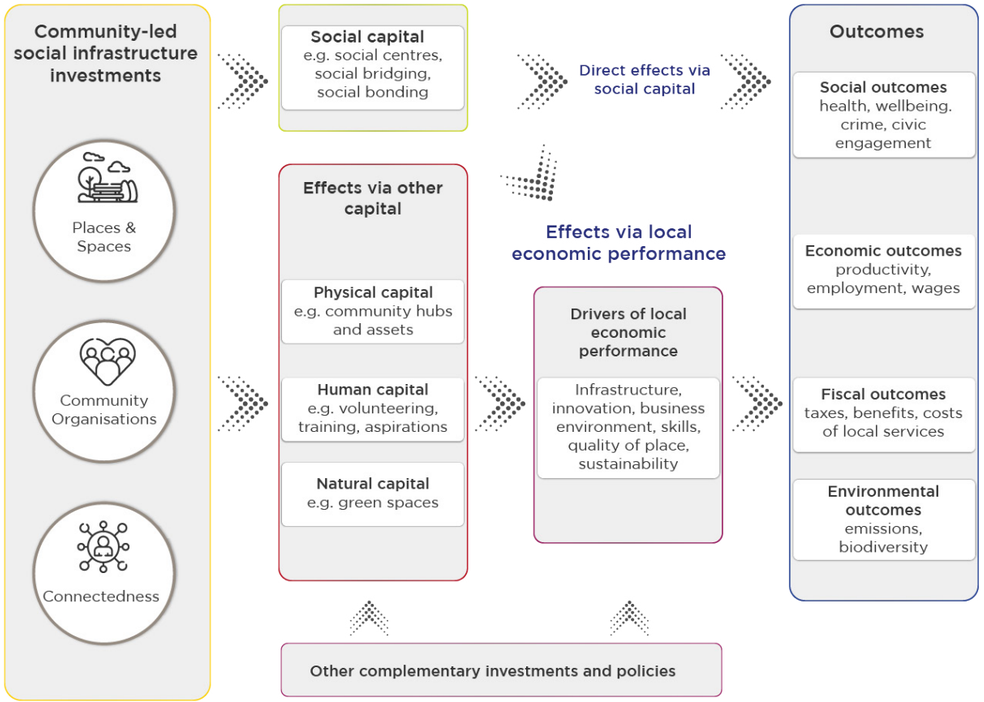


Figure 5: A framework for social infrastructure investment outcomes

In conclusion, integrating social value into infrastructure planning and investment is essential for ensuring that public expenditure generates broad, sustainable benefits for society. By prioritising social, economic, and environmental outcomes, particularly through community-led initiatives, social infrastructure investments can address disparities, foster stronger social networks, and improve the quality of life for marginalised communities. However, to fully realise the potential of social value, it is crucial to adopt decision-making frameworks that move beyond narrow financial assessments, incorporating the six capitals of King IV and embedding social value into infrastructure strategies. By fostering strong partnerships and implementing effective feedback mechanisms, communities can ensure that infrastructure projects meet immediate needs and also deliver long-term, inclusive benefits. This approach aligns with global best practices and is vital for creating resilient, thriving communities that contribute to a more equitable society.

8.3 Redefining Economic Development and Growth: A Systems Approach to Sustainability and Inclusion

Economic development and growth are pivotal concepts in shaping modern economies, yet they are often misunderstood and conflated in both policy and academic debates. While economic growth is traditionally defined as an increase in output, focusing on quantitative metrics such as GDP, economic development takes a broader view, emphasising qualitative improvements in societal wellbeing, innovation, and inclusivity.

Economic Development

Economic development is a fundamental concept within the systems view of the world, standing in contrast to the mechanistic and organismic perspectives, which prioritise efficiency and growth, respectively[34]. The systems view emphasises development as a dynamic and interconnected process, critical of traditional growth models often characterised by linearity, ethnocentrism, and determinism[34]. This perspective challenges conventional paradigms of economic growth, which are frequently rooted in non-systemic or mechanistic approaches that have led to destructive patterns, such as environmental degradation, inequality, and unsustainable practices. The systems view highlights the need for holistic and adaptive approaches that align with the complex realities of modern societies.

The term **economic development** is often conflated with **development** and **economic growth**, creating confusion in both policy and academic debates[35]. Economic growth is historically rooted in classical economic theory, defined as an increase in total output[36,37], typically measured by GDP. This view conceptualises the economy as a system that produces outputs (goods and services) through the application of inputs such as labour, land, and capital. As a result, economic growth is quantitatively straightforward to compute. In contrast, the concept of development remains less clearly defined[38], often focusing on qualitative dimensions such as innovation, entrepreneurship, and risk-taking, which propel economies toward higher growth trajectories[39]. These qualitative aspects are harder to measure, leading to ambiguities in understanding and applying the term.

Historical evidence[35] suggests that macroeconomic policies centered solely on growth have often failed to yield the desired improvements in productivity and societal wellbeing. Conversely, microeconomic perspectives on development offer more actionable insights for guiding economic growth. Development focuses on strengthening autonomy, building substantive freedoms, and enabling individuals to actively engage and contribute to the economy[40]. Economic development emphasises capacity-building and empowerment. A critical view highlights that economic development occurs when individuals, firms, and communities have the opportunity to expand their capabilities and fully participate in the economy. A robust definition emerging from this research states that[34]: "Economic development is defined as the expansion of capacities that contribute to the advancement of society through the realisation of individuals', firms', and communities' potential". This definition highlights the transformative and inclusive nature of economic development.

Economic development fosters prosperity and improves quality of life through several key capacities[35]:

- **Community capacity** refers to the physical, social, and environmental assets that shape the broader context for development.
- **Firm and industry capacity** encompasses the resources relevant to businesses, such as a skilled workforce, modern facilities, effective supply chains, and organisational structures. **Entrepreneurial capacity** highlights the potential for generating new businesses, requiring a culture of risk-taking, strong networks, access to financial capital, and a well-trained workforce.
- **Innovative infrastructure** enables the development of new products, processes, and organisations by providing the necessary facilities, support services, and an openness to taking risks.

Together, these capacities create a robust foundation for economic development that balances market efficiency with inclusivity and sustainability.

Economic Growth

Economic growth refers to the increase in the total output of goods and services produced by an economy over a specific period, typically measured by the rise in GDP. This growth is primarily quantitative, focusing on expanding the economy's productive capacity through inputs such as labour, land, and capital. Economic growth is historically rooted in classical and neoclassical economic theories, which see it as a critical driver of prosperity, job creation, and improved living standards. By producing more goods and services, economies can reduce unemployment, increase household incomes, and enhance overall economic wellbeing.

The significance of economic growth lies in its ability to sustain a nation's infrastructure, provide public services, and address societal challenges. For instance, countries experiencing steady economic growth often have the fiscal capacity to invest in healthcare, education, and technological advancements. A growing economy is also better positioned to attract foreign investments, stimulate entrepreneurship, and foster innovation. However, it is essential to recognise that while economic growth focuses on quantitative output expansion, it does not inherently address the qualitative dimensions of societal wellbeing, equity, or sustainability.

Importance of Economic Development and Economic Growth

The coexistence of economic development and economic growth is essential to achieving a holistic and sustainable economy. While economic growth emphasises expanding output, economic

development focuses on improving the quality of life by building individual, firm, and community capacities. Economic development strengthens autonomy and substantive freedoms, enabling individuals and communities to actively engage and contribute to economic life. For example, growth might increase GDP through industrial expansion, but without parallel investments in education and healthcare, the population might not benefit equitably.

A practical example of this interplay is in infrastructure growth and development. Economic growth can enable a government to fund large-scale infrastructure projects such as highways or power plants, creating jobs and boosting productivity. At the same time, economic development can ensure that these projects are inclusive and equitable, benefiting communities through accessible public transport systems or clean energy solutions. Similarly, infrastructure growth and development might result in the construction of new highways and bridges to improve connectivity, while infrastructure development can ensure that these projects incorporate inclusive features such as pedestrian walkways, accessible public transportation options, and environmentally sustainable designs that benefit all segments of the population. By aligning infrastructure growth with development, economies can achieve both short-term output expansion and long-term societal advancement.

Leveraging Strategic Infrastructure Investment for Inclusive and Sustainable Growth

Public infrastructure serves as a powerful tool for policymakers to drive economic growth and reduce inequality. Infrastructure investments are widely recognised for their multiplier effects, which are particularly impactful during times of crisis[34]. These effects are measurable through their economic and social outcomes, as evidenced by extensive research conducted by the World Bank. Drawing from over 300 case studies spanning nearly four decades (1983–2022), the findings underscore the transformative potential of public infrastructure investments, including: (a) digital infrastructure fostering employment growth; (b) energy access enabling structural transformation and advancing human development; and (c) transport infrastructure facilitating market access and socio-economic mobility.

Policymakers have consistently leveraged public infrastructure investments to address geographical disparities and promote inclusive growth[35]. This research reinforces the critical role of infrastructure in supporting development, highlighting how reliable energy access enhances firm productivity and economic competitiveness. Furthermore, transport infrastructure, particularly rural roads in Sub-Saharan Africa, has been shown to play a vital role in improving connectivity, fostering development, and promoting socio-economic integration. Similarly, investments in public transportation systems, railways, and ports yield significant positive impacts on both economic and human development. These findings provide compelling evidence that strategic infrastructure investments are essential for building resilient economies and fostering sustainable, equitable development.

Key WCG policy documents, such as the G4J Strategy, PLTF and WCIF 2050, present a unique opportunity to align their outcomes into a unified and coherent infrastructure pipeline. By integrating these strategic frameworks, the WCG can create a synergistic approach that enhances infrastructure planning and drives sustainable economic growth and resilience across the province. This alignment ensures that infrastructure investments are strategically prioritised to address pressing needs while unlocking opportunities to strengthen the Western Cape's economy.

Determining the optimal level of investment in physical infrastructure is a critical question for policymakers in developing economies. However, much of the available research data is based on industrialised economies, making direct comparisons challenging[3]. Despite these limitations, evidence underscores the role of robust infrastructure in supporting industrialisation, fostering innovation, and attracting foreign investments, objectives that align closely with the WCIF 2050's vision. A striking global example is China, where decades of infrastructure-led growth lifted over 750 million people out of poverty and sustained an average growth rate of 8.5% for decades.

Similarly, research by the Scottish Government[5] highlights the importance of inclusive growth, defined as "growth that combines increased prosperity with greater equity; that creates opportunities for all and distributes the dividends of increased prosperity fairly". This principle aligns with seminal studies[7-10] that paved the way for endogenous growth models, which emphasise human capital accumulation and infrastructure as central to economic development. While economic growth is essential for poverty reduction[6], it is not sufficient unless it is inclusive ensuring that the poorest populations actively participate in and benefit from the growth process. Research shows that the poverty-reducing impact of growth varies widely across countries and over time, depending on the structural changes accompanying the growth process. By prioritising inclusive growth, policymakers can achieve three key development goals[6]: reducing current poverty, enhancing the impact of growth on poverty alleviation, and fostering sustained future growth. These insights highlight the transformative potential of strategic infrastructure investments to drive equitable and sustainable economic progress.

and leveraging strategic infrastructure investments, policymakers can create an environment that fosters resilience, innovation, and shared prosperity. The WCG's approach, as articulated in the WCIF 2050, demonstrates a commitment to integrating infrastructure growth and development to address pressing challenges while building a foundation for long-term societal advancement. This balanced strategy aligns with global best practices and ensures that economic progress translates into meaningful improvements for all segments of society.

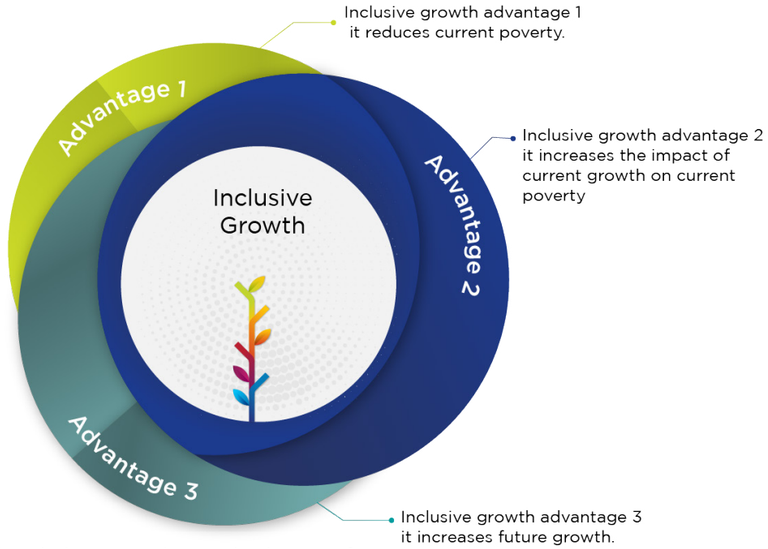


Figure 6: Inclusive economic growth advantages[6]

Inclusive growth has emerged as a central focus in economic policy frameworks worldwide, including that of the WCG. This approach emphasises fostering economic prosperity and ensuring that the benefits of growth are equitably distributed across all segments of society. By prioritising inclusive growth, the WCG aims to create opportunities for participation by marginalised communities, reduce inequality, and ensure that economic progress translates into tangible improvements in the quality of life for all residents. This commitment aligns with global best practices and emphasises the WCG's dedication to fostering a sustainable and equitable future.

In conclusion, the interplay between economic development and growth is essential for achieving sustainable and inclusive economic progress. Growth enables the expansion of output and provides the resources for large-scale investments, while development ensures that these resources are utilised to enhance societal wellbeing and reduce inequality. By prioritising inclusive growth

8.4 Alternative Financing Models for Infrastructure Development

As a developing nation, South Africa requires the WCIF 2050 to prioritise alternative sources of credit flows tailored to the country's unique context of financial stability, growth, and developmental needs. This is critical as traditional loan conditionalities imposed by multilateral funders, such as the IMF, World Bank and ECB[1] often introduce structural constraints that limit the flexibility of development trajectories. These challenges necessitate exploring alternative lending models and financial architectures that reduce the restrictive conditions typically associated with traditional loans [3,31,33].

In response, the BRICS+ nations have established alternative pathways that offer superior lending conditions, enabling development while promoting egalitarian reforms in the global financial architecture. Notable progress in this regard includes institutions and initiatives such as the Development Bank of Southern Africa (DBSA),

Asian Infrastructure Investment Bank (AIIB), the BRICS (New) Development Bank (NDB), the BRICS-led Contingency Reserve Fund (CRF), and the Silk Road projects[19].

While traditional multilateral lenders like the ECB, IMF, and World Bank tend to reinforce established funding frameworks and conventional policy discourse, the BRICS+ approach champions alternative developmental visions[20]. Representing over 32% of global GDP and projected by the IMF to account for one-third of global output by 2028, the BRICS+ nations are reshaping global growth dynamics by introducing perspectives from the Global South[20].

This movement signals a fundamental reform towards a more inclusive and just funding architecture, designed to serve emerging and developing economies[19-21]. The BRICS+ vision embodies the aspirations of these nations for multipolar sovereignty, enabling them to assert greater influence in global financial governance while fostering equitable development outcomes.

The emerging funding tools, methods, and platforms are purposefully designed to facilitate transactions in local currencies, thereby reducing dependence on dominant international currencies that often entail higher costs and inflationary pressures. Loans denominated in local currencies not only help mitigate these challenges but also protect participating nations from the misuse of reserve currencies and the geopolitical pressures they can impose. This shift promotes financial stability and sovereignty, allowing nations to better manage their economic risks without being subject to the volatility and political leverage associated with foreign reserve currencies. However, this issue can be mitigated by having a local investment bank act as an intermediary for foreign currency-denominated loans, further reducing the risks of currency exposure.

These two financial architectures reflect fundamentally different philosophies. The Western-dominated financial system, led by the IMF and World Bank, seeks to retain its hegemony through existing frameworks. In contrast, the BRICS+ or Global South financial architecture advocates for a multipolar world, emphasising financial autonomy and sovereignty[19-21].

The BRICS+ approach champions secure, resilient, stable, and open supply chains as indispensable to sustainable development[21]. It encourages nations to leverage their natural resources, strengthen cooperation across multipolar value chains, and avoid unilateral protectionist measures[21]. Additionally, this framework emphasises the need for a fair and equitable global system of data governance, addressing critical aspects such as data collection, storage, use, and cross-border transfers. It seeks to ensure the interoperability of data policy frameworks and to equitably distribute both monetary and non-monetary benefits of data with developing countries[20,21].

A persistent challenge for developing nations is the financing gap, which is the shortfall in budget allocations, investments, and national policy frameworks that must be aligned to the SDGs[20]. This concern, highlighted by the United Nations, underscores the urgency for financing tools explicitly designed for SDG-oriented projects with a strong focus on development impact.

The Indonesian government has implemented innovative financing initiatives, leveraging Multi-Stakeholder Partnerships to address funding challenges[22]. One such approach is the use of blended finance, which combines public and private funds to advance the Sustainable Development Goals (SDGs). Blended finance enables governments to attract large-scale private investment while minimising the impact on their fiscal burden. Another innovative tool is the issuance of SDG bonds, which are designed to mobilise resources from the non-public sector, aligning private capital with public development priorities[22].

Creative financing models, like India, focus on supporting micro, small, and medium enterprises (MSMEs). These models encourage banks to compete in offering lower interest rates to MSMEs that collaborate with large projects or companies, fostering inclusive economic growth[22]. However, traditional and multilateral funding mechanisms remain expensive and often come with conditionalities that impose significant constraints on developing nations. These challenges underscore the importance of exploring alternative and innovative financing options to meet development objectives effectively.

Funding Research Insights

Recent research highlights limited yet critical sources of funding for development projects, such as[23]:

1. **Global South Governments** (domestic funding)
2. **Development Partners**[22]
3. **Private Companies**
4. **Impact Investors**
5. **Collaborative Corporate Social Responsibility or Shared Value Creation Initiatives**
6. **Private Equity/Venture Capital Funds**

This review serves as a valuable baseline, with the expectation that reporting standards will become more robust and harmonised in the coming years[23]. Among these funding sources, the following breakdown provides further insights[23]:

- Governments are the largest contributors, accounting for **60–70%** of funding. For instance, the Chinese government is a significant investor, allocating over **USD 20–25 billion annually** to agriculture and innovation. Also, the UNFCCC Loss and Damage Fund that will assist in 'build-back-better' infrastructure that has been lost from climate related disaster risks.
- The private sector ranks as the second-largest funding source, contributing **20–25%**. This funding supports research, marketing, and the development of new technologies such as **farm mechanisation, crop protection, seed development**, and **biotechnology**.
- Development partners, including bilateral and multilateral agencies, NGOs, and philanthropies, contribute **10–20%**. These institutional investors play a critical role in funding projects with a focus on sustainability and development impact.

Climate Resilience in Infrastructure

Research by the OECD[24] emphasises the need to incorporate **climate resilience** into infrastructure funding and design. Key recommendations include[24]:

- **Fiscal Planning and Allocation**: Governments should integrate resilience into the **conception, procurement processes, and Public-Private Partnerships (PPPs)** for infrastructure projects.
- **Funding and Technical Assistance**: Ensure that borrowing and programming for infrastructure explicitly include provisions for **climate resilience**, supported by funding and technical expertise.

All these ideas are directly supported by the **WCIF 2050 principles**, which seamlessly align with its Strategy (**WCIS 2050**) and its Implementation Plan (**WCIIP 2050**). To enhance innovative funding and partnership models, it is critical to align with foundational infrastructure principles, which include the following[24]:

- **Leverage Financial Instruments**: Governments can utilise tools such as green bonds and sustainable bonds to support resilient infrastructure. Instruments like catastrophe bonds (cat-bonds), which are outcome-based and emphasise risk-sharing, offer innovative approaches to financing.
- **Blended Finance with Climate Objectives**: By combining public and private funding with climate-oriented goals, blended finance tools can effectively support the development of resilient infrastructure.
- **Infrastructure-Focused Financial Institutions**: Public infrastructure projects can be funded through infrastructure-focused banks, development banks, or dedicated funds with climate mandates. These mechanisms are designed to attract private sector investment to bolster public infrastructure development.
- **Tax Incentives for Resilient Infrastructure**: Governments should explore tax incentives for infrastructure assets to encourage innovations that enhance resilience and sustainability.
- **Emission Trading and Land Value Capture**: Instruments like **emission trading** can secure funding while enabling land value capture of assets. These mechanisms can create sustainable funding pools to support long-term infrastructure goals.

WEF Financing instruments for infrastructure adaptation and resilience[6,10,14]

OUTCOME BASED INSTRUMENTS	CATALYTIC INVESTMENTS	DISASTER RISK	TRADITIONAL INVESTMENT	
Adaptation benefits mechanism	Risk guarantees	Climate resilient debt clauses	Technical assistance	Loans
Debt-for-nature -swaps	Sub-ordinate capital	Parametric insurance	Project preparation facility	Equity
Nature-based credits	Credit tranching | Bundling | Green securitisation	CAT bonds	Bonds (eg. Green or Climate bonds)	Concessional debt (e.g. IDA)
Sustainability linked bonds	Pool investment funds	Regional insurance pools		
Development policy lending (CAT DOO)				

Table 1: Typical infrastructure funding tools[24,28,32]

Portfolio of Funding Streams for All Infrastructure

Financing infrastructure involves securing funding not only to repay capital costs but also to cover ongoing operations and maintenance[24]. A lack of sufficient funding can undermine both new and existing infrastructure assets, leading to inefficiencies and eventual degradation[24,25]. While funding mechanisms are largely consistent across all types of infrastructure, they are subject to the following typical considerations outlined by the OECD[24]:

- **Taxes** – provision of grants and subsidies from general taxation, earmarked tax revenues and may be transferred between levels of the State.
- **User charges** – payments from beneficiaries of infrastructure services like toll roads, utility tariffs, sales of services, and payments for Ecosystem Services.
- **Ancillary revenues** – advertising, sale of data, property income (e.g., rents from retail spaces).
- **International transfers** – Overseas Development Assistance (ODA), climate finance, NGO (philanthropy).
- **Land value capture** – increment charges in property values resulting from infrastructure provision and offset land banking.

Land Value Capture

Land value capture refers to a range of taxes, user charges, fees, or revenue-generating mechanisms aimed at harnessing the gains derived from increases in land value resulting from infrastructural investments. Although these instruments are employed in many countries, most lack a formal legal framework or clear justification for their implementation[24]. The taxonomy of land value capture instruments includes the following:

- **Infrastructure Levies** – taxes or fees imposed on landowners whose properties have appreciated in value due to government-initiated infrastructure development.
- **Developer Obligations** – cash or in-kind contributions required from developers to offset the costs of providing additional infrastructure services to private developments.
- **Charges for Development Rights** – payments, either in cash or in-kind, made in exchange for rights to develop land beyond a designated density threshold or baseline.
- **Land Readjustment** – a process that pools fragmented land parcels for joint development, requiring landowners to transfer a portion of their land for public use, such as roads or parks, in return for increased land value.
- **Strategic Land Management** – governments proactively **buying, developing, selling, or leasing land** to meet public needs while recouping value increments generated by public infrastructure investments.

Innovative Revenues for Infrastructure (IRI)

An additional funding tool is **Innovative Revenues for Infrastructure (IRI)**, which leverages revenues generated from infrastructure assets. Examples include **advertising revenues** from rail billboards or digital signage[30]. IRI builds upon traditional funding mechanisms like **Land Value Capture (LVC)** and **Commercial Value Capture (CVC)**, extending them into novel revenue-generation strategies.

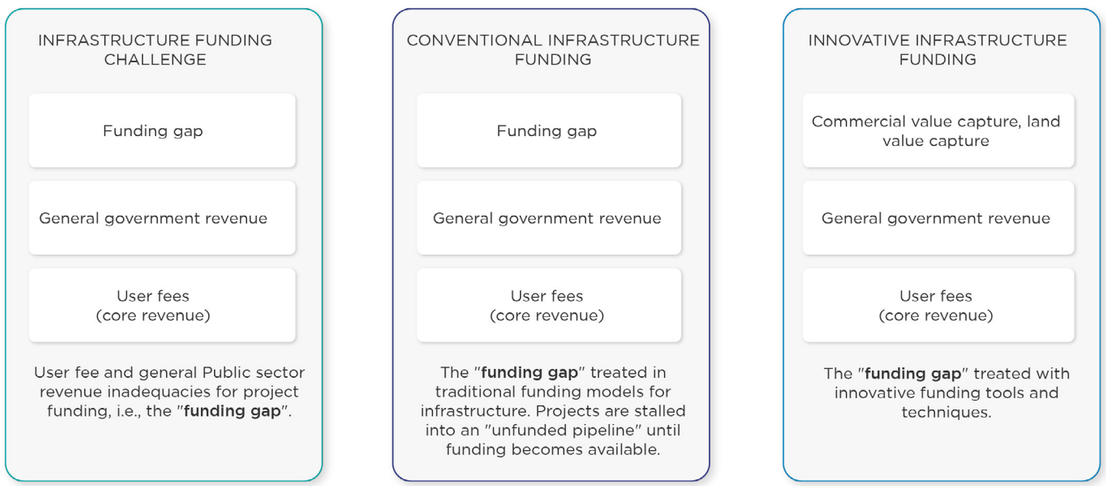


Figure 7: World Bank views on infrastructure gaps and required innovation[30]

These mechanisms are designed to:

- Rely less on direct government budget allocations.
- Tap into the demand for services, creating sustainable funding streams.
- Attract alternative revenue sources, reducing dependency on conventional taxation.

These innovative funding streams provide flexibility and scalability for financing infrastructure projects while aligning financial sustainability with user and commercial demand.

(See Figure 7 for an illustrative framework of IRI in action.)

Commercial Value Capture (CVC) Revenue Stream Innovations

While **Commercial Value Capture (CVC)** is often associated with mass transit, its application extends to a wide range of infrastructure sectors, including tourism, energy, waste management, telecommunications, biochar, and composting[30]. By leveraging the commercial potential of these infrastructure assets, CVC can generate sustainable funding streams that support ongoing development and maintenance across diverse sectors.

Infrastructure Spending Requirements and the WCIF 2050, WCIS 2050 & WCIIP 2050

A World Bank study[26] highlights South Africa's infrastructure spending needs for critical sectors, including transport, water and sanitation, basic education, and TVET (Technical and Vocational Education and Training). The required investment between 2022 and 2030[26] is estimated to range between R4.8 trillion and R6.2 trillion. While investing in infrastructure is essential, the study stresses that a steady flow of resources for operations, maintenance, and service delivery is equally crucial for long-term success success[26-30].

The study emphasises the importance of "spending better", meaning that financial allocations should be directed towards the right objectives and underpinned by relevant metrics. This principle aligns with the goals of the WCIF 2050, which strives to ensure that investments are optimally prioritised. The WCIS 2050 and WCIIP 2050 adopt the World Bank's analytical frameworks[26,28,30,32] to guide the allocation of resources in a way that maximises policy impact and supports sustainable development choices[28,30,32]. By incorporating these strategic insights, the WCIS 2050 aims to channel investments efficiently, ensuring that South Africa's infrastructure development is both effective and future-proof.

The WCG's approach to infrastructure financing must prioritise innovative models. By embracing these alternatives, the WCG can foster a more resilient, autonomous, and inclusive financial system. Through strategic models like blended finance, land value capture, and commercial value capture, the WCG can address its significant infrastructure funding gaps, particularly for essential sectors like transport, water and education. These approaches, aligned with the principles of the WCIF 2050, ensure that investments are financially viable and also socially and environmentally impactful. To drive long-term success, it is crucial that the WCG integrates these innovative financing tools into its broader development strategies, ensuring that infrastructure projects deliver substantial value to communities, promote equitable growth, and contribute to the country's sustainable future.

8.5 Conclusion

Incorporating social value into infrastructure planning and investment is not just an aspirational goal but a necessary approach for addressing the multidimensional challenges of the 21st century. By embedding social value into decision-making frameworks, governments and stakeholders can align infrastructure projects with broader societal goals, fostering inclusive, equitable, and sustainable communities. As demonstrated through the integration of social value outcomes in the WCIF 2050, this approach ensures that public expenditure generates tangible and lasting benefits for all segments of society, particularly those who have historically been marginalised.

The transformative potential of social infrastructure lies in its ability to bridge societal gaps by fostering cohesion, enabling community engagement, and improving quality of life. Investments in places and spaces, community organisations, and connectedness yield significant economic, social, and environmental returns. Beyond monetary gains, these investments contribute to a shared sense of civic life and wellbeing, addressing disparities and strengthening communities.

To further foster investment and development in social infrastructure, mechanisms like **social impact bonds** and **outcome funds** will also be considered. These financial instruments incentivise outcomes that benefit communities, aligning funding with measurable social impacts. Resources from Oxford's GO Lab provide valuable insights into the structure and application of these mechanisms, offering useful definitions and explanations that could support the adoption of such innovative financing strategies. The integration of these approaches is vital for ensuring that infrastructure serves as a platform for empowerment, progress, and long-term societal benefits.

Simultaneously, redefining economic development and growth through a systems perspective highlights the importance of qualitative improvements, such as innovation, inclusivity, and sustainability. Moving beyond mechanistic growth models, this approach acknowledges the role of governance in balancing market efficiency with societal wellbeing. Infrastructure, as both a driver and beneficiary of this balanced approach, becomes a catalyst for fostering autonomy, resilience, and collective capacity within communities.

The need for innovative financing models is equally critical in bridging the infrastructure funding gap. Alternative mechanisms, such as blended finance, land value capture, and commercial value capture, offer sustainable solutions for mobilising resources while addressing structural constraints. By leveraging the evolving financial architectures of BRICS+ and aligning investments with local priorities, the Western Cape can position itself for long-term infrastructure resilience and economic autonomy. These models, coupled with strategic partnerships and innovative tools, emphasise the importance of aligning financial and development goals for shared prosperity.

Ultimately, the integration of social value, systems-based infrastructure development and growth, and alternative financing models provides a holistic approach to achieving sustainable infrastructure growth and development. This holistic approach will be operationalised through the WCIIP 2050, ensuring these principles translate into tangible and measurable benefits for society. By fostering inclusive growth, empowering communities, and ensuring financial sustainability, the WCG can address present challenges while building a resilient and equitable future for all.

Chapter 9

Monitoring and Evaluation

9.1 Introduction

The WCIF 2050 is a transversal framework purposed for integrating infrastructure activities, and notes the following core Monitoring and Evaluation (M&E) challenges[14]:

- Robust integrated infrastructure planning, implementation, and oversight.
- Alignment of the diverse infrastructure policy provisions like PSDF, PLTF, NDP, NIP, to strengthen service delivery.
- Clarify roles, relations and integration needs among institutions.
- Effective collaboration agreements and institutional arrangements.
- Reduce red-tape (EODB from G4J) and extract efficiencies.
- Trust-based harmonisation and Communities-of-Practice.

These challenges should be seen as higher order challenges to building true integrated service delivery for the WCG. The M&E strategies to mitigate these risks must therefore operate at a meta-level since it relates to integrative compliance, design, planning and action. As such, the WCIS 2050's M&E strategies should function at a meta-level compared to current departmental level M&E functions. In this way, the value-add of WCIS 2050 explicitly covers integrative and collaborative needs that are outside of the boundaries of current operational M&E requirements and models. This then directly ensures value-add of the WCIS 2050 to all parties equally. Another area the meta-level M&E will clarify, is how it will dovetail and support initiatives such as the Western Cape Infrastructure Delivery Management System (WCIDMS), and the Framework Infrastructure Delivery Procurement Management (FIDPM) used in public sector infrastructure procurement.

Also, the WCIF 2050 recommends the establishment of Communities of Practice (COPs) to engage in innovation, planning, execution, and implementation stages, to build harmonisation between WCG and its stakeholders. These COPs can work in conjunction with advisory panels focused on specific areas such as financing, investment and partnerships, which would operate at the practical levels of the governing frame. This multi-tiered approach ensures collaborative input across stages of infrastructure from conceptualisation to execution.

In this context, the establishment of the Infrastructure Ministerial Committee plays a critical role in enhancing governance and co-ordination across WCG stakeholders. To support its efforts, the following M&E strategies will be instrumental in ensuring effective oversight and continuous improvement[15]:

- **Overall coordination of infrastructure planning and associated project pipelines** – this involves driving critical-transitions related to spatial alignment, coordination, and integration. It also focuses on addressing climate change and resilience, promoting labour-intensive practices, and encouraging technological and social innovation.
- **Facilitate infrastructure programming** – this drives system wide improvements and reforms, facilitating knowledge transfer, via systemic methodologies (e.g., Iceberg, 12-Lever, CLA, Gigamap visualisation, DOI's Strategy Design Playbook (SDP), Critical-Futures design, and technologies having ubiquity and federated designs).
- **Meta-monitoring and evaluation** – This level emphasises the monitoring and evaluation of meta-needs contained in the Panoptic Principles to ensure integrated prescript compliance at stage gates across framework, strategy and implementation. This is differentiated and distinct from traditional M&E fulfilled at the departmental levels as part of their routine operations and obligations.

These M&E features are all situated at a meta-level, forming essential components of the transversal M&E framework for WCG infrastructure. Importantly it flows from provincial policies such as the PSDF, PLTF, G4J and WCIF 2050, which collectively recognise the following:

- Budgetary process demands and austerity.
- Weak planning, including coordination and integration.
- Misaligned needs.
- Diverse project selection criteria can contribute to infrastructure failure.
- Prioritisation challenges.

These WCG-wide features, targeted by the WCIS 2050's improvement strategies, will play a central role in the implementation phase (WCIIP 2050). This meta-level M&E needs to achieve outcomes such as:

- Ensuring that project features consistently align with both current and future WCG policy metrics, business requirements, and population data to strengthen infrastructure capacities.
- Fostering critical and innovative collaborations for infrastructure funding through proposed private sector partnerships, addressing the limitations of traditional funding approaches.
- Promoting efficient integration and coordination to minimise costs and reduce excessive management.
- Facilitating early stakeholder engagement, education, and communication to ensure alignment and buy-in across all parties.
- Providing guidance on conflict management and performance boundary issues, as outlined by governance frameworks and agreements at the WCG executive level.
- Enhancing capabilities and capacity-building efforts to support the long-term adoption and harmonisation of the WCIF 2050.

9.2 Review of holistic monitoring and evaluation

Critical research on M&E highlights several weaknesses in organisational activities that hinder evidence-informed policymaking (EIP)[7]. Key insights include[7]: (a) M&E tools that genuinely guide stakeholders are scarce; (b) M&E frameworks must incorporate robust logic models (theory-of-change) and indicators to evaluate the linkages between research and policy or science and practice; and (c) M&E tools should be adaptable and applied flexibly, considering the maturity of the system. The use of reliable evidence to inform public policy is essential for promoting more equitable social outcomes[2] and optimising resource allocation. Growing global interest in M&E research has underscored the importance of knowledge translation in bridging the gap between research and policy[1,3]. Knowledge translation is defined as[1] "the exchange, synthesis, and effective communication of reliable and relevant results (both research and practice) to ensure that effective interventions are designed and implemented".

Translating research into policy is an iterative process[5] that recognises the influence of the political economy on decision-making[7]. This necessitates adopting a systems approach, which shifts the focus from evaluating individual components to understanding the dynamic, integrative aspects of complex systems[6]. Examples of such efforts include[7]: (1) the European Union's Evidence-informed Policy Network, which employs a systems thinking approach; (2) the Knowledge Translation networks used to Build Capacity Using Research Evidence (BCURE); (3) the Partnership for Evidence and Equity in Responsive Social Systems (PEERSS); and (4) the Regional East African Community Health Policy Initiative (REACH-PI). These global

initiatives exemplify the application of holistic M&E models that integrate research, policy and practice.

Advances in behavioural science, decision-making, and social science reveal that bias and even irrationality[7] are common challenges in governance. These issues underscore the need for transversal governance and critical reflection to guard against these flaws, which can significantly influence leadership, management, and social practices[7-9]. Such challenges have a direct and material impact on democracies[7], with global experts from various scientific disciplines urging governments and policymakers to recognise the critical links between evidence-informed policymaking[6,7] and effective governance, and to ensure these links are not taken for granted. This context highlights the role of M&E in the WCIS 2050, emphasising how it aims to add value across infrastructure ecosystems and stakeholder communities, fostering informed, accountable, and resilient governance.

The latest scientific thinking on the implications for policymaking includes several critical insights[6]:

- **Misperception and Disinformation** – Modern information environments challenge our thinking skills, making us vulnerable to disinformation. This calls for critical reflection and the need for robust tools to counter misleading information.
- **Emotions** – The difficulty in separating emotion from reason underscores the need for emotional literacy in policymaking to ensure more rational, empathetic decisions to improve policy.
- **Values and Identities** – While values and identities are known to drive political behavior, they remain poorly understood. This gap highlights the importance of considering the deeper social and cultural factors influencing decision-making.
- **Framing, Metaphor, and Narrative** – The way facts are presented, shaped, or framed can heavily influence public understanding and policy outcomes, often distorting the reality they are meant to convey.
- **Trust and Openness** – The erosion of trust in experts and government institutions can only be repaired through greater honesty, transparency, and public deliberation about interests and values.
- **Evidence-Informed Policymaking** – Evidence is under attack, and there is a critical need for politicians, scientists, and civil society to defend evidence-based decision-making as a cornerstone of liberal democracy.

Fortunately, advancements in systems science offer promising strategies to address these challenges. One notable example is the **Global Evaluation Initiative (GEI)**, which uses communication tools to facilitate community participation and engagement, aiming to foster transformative M&E[9]. The GEI's approach combines research, monitoring, and evaluation (RM&E)[9] tools to create a holistic framework, incorporating seven key elements to guide M&E decisions (see Figure 1). This programme's ability to address complex, interrelated cultural and contextual factors brings about social and behavioural change, offering valuable lessons for improving policymaking in complex environments.

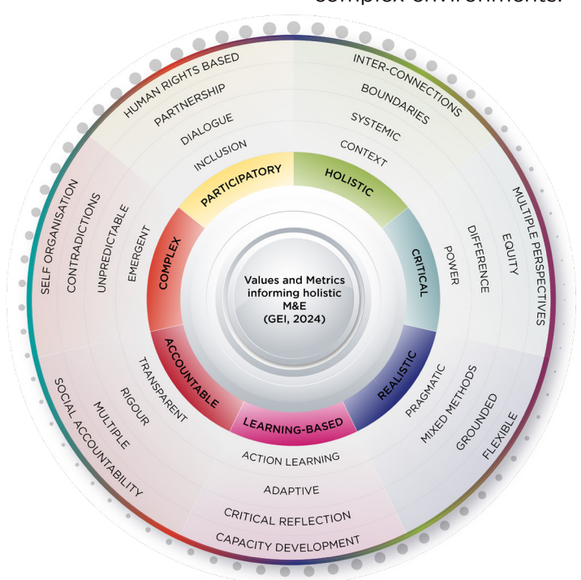


Figure 1: Values informing Research, Monitoring and Evaluation[9]

This type of meta-evaluation, as outlined in the WCIF 2050, is crucial for ensuring continuous improvement in infrastructure delivery in the Western Cape. To achieve this, it must be embedded in both the strategy and implementation phases of the WCIF 2050, enabling critical reflection and regular reviews of infrastructure projects. By incorporating a robust M&E strategy, the WCIF 2050 will provide accessible, measurable expert assessments, including peer reviews, technical evaluations, financial analyses, and more. This approach ensures that the WCIS 2050 equips the Western Cape infrastructure ecosystem with the capacity to understand, appreciate, and act on the vision of the WCIF 2050.

Importantly, the WCIF 2050's transversal value is made visible across the infrastructure ecosystem, fostering a comprehensive understanding of its broad implications. By emphasising critical reflection throughout the research, monitoring, and evaluation (RM&E) process, the WCIS 2050 will uphold high standards of quality from research to its practical application. This ensures that the WCG's outcomes are directly aligned with its overarching strategic goals.

The meta-M&E strategy also facilitates authentic critical reflection, creating an ongoing learning environment that aligns outcomes with capacity development. Being participatory in nature, this approach promotes mutual learning and engagement between partner institutions and community groups, further enhancing the relevance and impact of the policy.

Additionally, the proposed meta-evaluation includes the capacity to assess the evaluation process itself, as discussed by Lopez Peralta[10]. This capability allows for adjustments to future evaluations, ensuring that they remain compliant with policy, reflect meaningful changes, support organisational learning, and incorporate novel practices. In this way, the WCIF 2050's M&E strategy not only drives improvements but also fosters a culture of continuous learning and adaptability within the infrastructure ecosystem.

9.3 Meta-level evaluation in context of theory of change and logic frameworks

Multilateral institutions, such as the United Nations, advocate for the use of the Theory of Change (TOC) framework in intervention monitoring[11,12]. This approach is recognised for its ability to map the pathways that lead to targeted changes in knowledge, behaviour, attitudes, or practices at various levels (individual, institutional, or community)[11]. By clearly outlining the steps and causal relationships required to achieve desired outcomes, the TOC provides a structured method for understanding how specific interventions contribute to long-term change. This framework is particularly valuable in the context of complex, multi-stakeholder initiatives, as it facilitates alignment among stakeholders, clarifies expectations, and supports ongoing learning and adaptation throughout the implementation process.

While TOCs may not always provide exhaustive details, from a systemic M&E perspective, they serve as a powerful tool for measuring core areas critical to driving transformation levers[8,13]. The TOC outlines the necessary steps to achieve a long-term goal and describes the types of interventions (e.g., projects or programmes) that will facilitate the desired change[11]. It also includes the core assumptions that stakeholders rely on to explain how change occurs. The TOC tool aids M&E in several ways[11]:

- **Pathway Clarity**: It helps in demonstrating the pathways through which goals are achieved, providing a clear visual or conceptual representation of how change unfolds.
- **Assumption Testing**: It encourages stakeholders to reflect on and test the underlying assumptions that drive their strategies, making it possible to measure and assess their validity over time.
- **Outcome vs. Activity Focus**: The TOC places emphasis on what the organisation aims to achieve, rather than solely on the activities it is carrying out. This shift helps ensure that the focus remains on results and impact, rather than merely on outputs or processes.

In this way, the TOC not only enhances the effectiveness of M&E by providing a structured framework, but it also promotes a deeper understanding of the drivers and barriers to change, fostering more informed decision-making and adjustments during implementation.

The TOC tool relies on logical frameworks or logic models, which offer a structured, linear approach to understanding the relationships and linkages between inputs, activities, outputs, outcomes, and impacts in relation to the overall objectives and goals. This framework demonstrates the causal connections between each stage of the process, from the initial inputs required to execute activities, to the resulting outputs, followed by the outcomes, and ultimately the desired impacts. This systematic approach is why TOCs have been widely

adopted by institutions such as the UN and various governments, including South Africa.

Building on this foundation, the WCIS 2050 aligns its M&E strategy with the existing public sector logical framework and its theory of change flow. This alignment will ensure that the M&E strategy supports and strengthens current monitoring and evaluation tools while adding integrative value to the infrastructure ecosystem of the WCG. By aligning with established frameworks, the WCIS 2050 will enhance the overall effectiveness of the M&E efforts, providing a more holistic approach to infrastructure development and its related governance processes.

In this way, the WCIS 2050 will not only support existing M&E tools but also contribute to the broader, cross-sectoral integration necessary for long-term success, as illustrated in the Figure 2. This strategic alignment will foster more effective planning, monitoring, and evaluation, ultimately driving better outcomes for infrastructure development and resilience in the region.

In conclusion, the research emphasises that inputs, activities, and outputs are generally associated with monitoring activities, while outcomes and impacts are linked to evaluation activities. The insights from this approach have been instrumental in shaping the M&E strategy for the WCIS 2050, ensuring that it adds integrative value to the Western Cape's infrastructure stakeholders.

The following considerations are crucial to reinforcing the WCIS 2050's meta-M&E strategy:

- **Participatory M&E:** Criticisms of traditional M&E often highlight concerns about credibility, legitimacy, impartiality, and independence. By co-creating M&E strategies with key stakeholders, these participation efforts enhance the legitimacy of the process and foster trust in its outcomes.
- **Ethics:** As a cornerstone of governance and compliance, ethics, as outlined in the King IV report, presents challenges, especially when dominant powers use their leverage to control sensitive topics. Ethical considerations must be embedded in M&E practices to ensure fair, transparent, and accountable decision-making.
- **Context of Systems, Boundaries, and Interconnections:** A holistic approach to M&E must consider the systems, structures, and contexts within which people operate, recognising that individuals and groups may have different worldviews. Cultivating an empathetic disposition and finding common ground is essential for fostering collaboration and agreement across diverse perspectives.
- **Structural Barriers:** Institutional barriers to a holistic approach are common, and overcoming these challenges requires ongoing critical discussions, patience, and diligence. Promoting collaboration and integration requires addressing these barriers and advocating for the long-term benefits of a unified approach.
- **Resourcing:** The allocation of resources requires a balanced approach, where financial resources should not take precedence over other crucial factors, such as ecology and community welfare. Managing tensions between holistic thinking and practical realities is key to determining and securing the necessary resources, including labour, land, intellectual property, and technology.
- **Granularity:** M&E must consider the various levels, layers, and depths of focus, ensuring that these are clearly defined and not conflated. This granularity is essential for developing a holistic understanding, as highlighted in the WCIS 2050, and for ensuring that M&E efforts are tailored to the specific needs and complexity of the infrastructure projects being evaluated.

By integrating these principles, the **WCIS 2050's meta-M&E strategy** will provide a comprehensive, inclusive, and effective approach to monitoring and evaluating the WCIF 2050, promoting long-term sustainability, resilience, and equitable infrastructure development for the Western Cape.

As illustrated, the primary purpose of the **M&E strategy** is to integrate meta-level aspects using the **Panoptic Principles**, **Priority Focus Areas and the Strategic Thrusts responding to the ToC**. These meta-level metrics will be complemented by physical and financial project delivery data, enabling the review and interpretation of the relationships between meta and operational metrics. Together, these insights will serve as a communication tool to facilitate the **WCIS 2050's M&E**, allowing the WCG and its implementing departments and partners to:

- **Course-correct strategic direction**: Utilise feedback data to adjust and align infrastructure strategies, ensuring that goals remain responsive to evolving needs and challenges.
- **Implement practical, always-on M&E functions**: Establish continuous monitoring and evaluation across the Western Cape Infrastructure Project Pipeline, ensuring real-time insights into project progress and performance.

	IF INPUTS	THEN IF ACTIVITIES	THEN IF OUTPUTS	THEN IF OUTCOMES	THEN IMPACT
Each Strategic planning cycle covers a 5-year period: each period is decomposed into individual years, all having: 1. **Annual Performance Plan (APP)** 2. **Annual Operational Plan (AOP)** 3. **Annual Report (AR) all being part of Public sector planning compliance** **These documents are also informants to the service delivery improvement plan (SDIP).**	**WHAT WE INVEST:** The financial, human, and material resources that are necessary for the activities to take place and the outputs to be produced.	**WHAT WE DO:** The activities are the necessary tasks undertaken by personnel to transform the inputs to outputs.	**WHAT WE ACHIEVE:** Outputs are the products and services produced. It is the results of a project. The outputs are SMART (specific, measurable, achievable, realistic and time-bound) and must be precisely and verifiably defined.	**WHAT CHANGES**: Outcomes (first step in an impact evaluation) are the effects of outputs. An outcome is the benefit of whatever it is that you want to do (shift, change, movement, benefit). What is the changed situation you want to achieve by the end of your project? Outcomes must be SMART.	**THE CONSEQUENCES:** The consequences of the programmes/ projects. Impacts tend to be longer-term and so may be equated with goals. Impact indicator: Expression or indication of impact. Evidence that the impact has been achieved. Impact must be SMART.
	EXAMPLES: Staff, Time, Money, Research base, Materials, Equipment, Technology, Partners.	**EXAMPLES:** Deliver services, Develop products and resources, Education and training, Network with others, Build partnerships, Advocacy, Facilitation, Work with businesses.	**EXAMPLES:** Number of businesses reached; Number of people trained; Number and type of services delivered; Number of projects delivered; Number of research projects undertaken.	**CHANGES IN:** Knowledge, Attitude, Skills, Behaviour, Decision-making, Policies, Social action.	**CHANGES IN:** Conditions, Economic, Social (wellbeing), Health, Civic, Environmental.
	WHERE INFORMATION IS REPORTED: Both Inputs and activities outlined in the annual operational plan (**AOP**).	**WHERE INFORMATION IS REPORTED:** Both Inputs and activities outlined in the annual operational plan (**AOP**).	**WHERE INFORMATION IS REPORTED:** The outputs and its performance indicators and targets are outlined in the annual performance plan (**APP + AR**).	**WHERE INFORMATION IS REPORTED:** The outcomes and its indicators and targets are outlined in the 5yr strategic plan (**SP**).	**WHERE INFORMATION IS REPORTED:** All outcomes contribute to the impact statement and its indicators outlined in the 5yr strategic plan (**SP**).

Table 1: DPME public sector logic model framework for M&E

- **Offer accessible open data to stakeholders**: Provide stakeholders with open access to data, empowering them to conduct their own analysis and contribute to decision-making processes.
- **Track WCG strategies and associated outcomes**: Monitor the alignment of infrastructure projects with broader provincial strategies, measuring the effectiveness and impact of infrastructure strategies over time.
- **Provide learning and development tools**: Support empathetic planning and integration through resources that foster cross-sectoral collaboration and enhance stakeholder engagement.
- **Support WCG oversight activities and programme evaluation**: Facilitate policy and governance oversight by evaluating infrastructure programmes, ensuring they align with strategic priorities and support desired outcomes.
- **Build support for community-of-practice**: Strengthen ecosystem capacities by promoting collaboration and knowledge-sharing across stakeholders, fostering a shared learning environment.
- **Embed governance and compliance metrics using Panoptic Principles**: Integrate robust governance and compliance frameworks into the M&E process, ensuring that all infrastructure activities adhere to the highest standards of accountability and transparency.

By incorporating these functions, the **WCIS 2050's M&E** strategy will create a dynamic, transparent, and responsive framework for infrastructure planning, execution, and evaluation across the **WCG**, ensuring that projects contribute to long-term sustainable development in the region.

9.4 Conclusion

The WCIS 2050's Monitoring and Evaluation (M&E) strategy sets a robust meta-level framework to address the higher-order challenges in infrastructure planning and delivery, ensuring its alignment with the WCG's broader objectives. By prioritising integration, harmonisation, and collaboration, this strategy directly mitigates systemic issues such as misaligned roles, fragmented planning, and inefficiencies in service delivery. The proposed Communities of Practice (COPs) and advisory panels offer an inclusive platform for diverse stakeholders to contribute across the entire infrastructure lifecycle, from conceptualisation to implementation, fostering innovation and trust-based partnerships.

Central to the WCIS 2050 is the establishment of a transversal M&E approach that focuses on meta-monitoring and evaluation. This approach provides guidance for aligning the WCIF 2050 and WCIS 2050 with provincial policies like the PSDF, PLTF, and G4J, emphasising integrative compliance and performance. Importantly, the meta-M&E approach addresses critical gaps in traditional departmental-level M&E models by promoting cross-sectoral learning, innovation, and collaborative action. This ensures that all stakeholders, from government departments to private entities and communities, can effectively engage in the infrastructure ecosystem while addressing key challenges such as resource constraints and inefficiencies.

The inclusion of the Theory of Change and Logic Model Framework within the M&E strategy enables the WCG to map out clear pathways for achieving long-term goals while emphasising iterative learning and adaptation. This shifts the focus from outputs to outcomes and impacts, ensuring that infrastructure strategies and implementation remain responsive to evolving socio-economic and environmental needs. By integrating the Panoptic Principles and Priority Focus Areas, the strategy not only promotes compliance and governance but also ensures that infrastructure projects align with the WCG's broader strategic goals for resilience, inclusivity, and sustainability.

Chapter 10

Risk Management and Mitigation Strategies

10.1 Introduction

The WCIF 2050 acknowledges that the historically fragmented design and evolution of critical infrastructure systems, such as roads, rail, finance, food, water, energy, and buildings, were not originally conceived to withstand the complex and concurrent systemic risks we face today. This reality has driven multilateral institutions, including the UN, UNDRR, IPCC, and OECD, to closely examine the underlying drivers of systemic risk, its governance structures, and its increasingly pervasive impacts. Their studies emphasise the urgent need for more resilient and integrated infrastructure systems capable of addressing the interconnected challenges of our time[1-4].

Systemic risks refer to the networked risks that emerge from interconnected and interdependent infrastructure systems[2,20], characterised by high complexity, multiple uncertainties, and ambiguities. These risks, when combined, generate transgressive effects that impact systems beyond their point of origin[4]. Unlike traditional risk management, systemic risks pose new and unresolved challenges for policymaking and governance due to their pervasive negative effects, which extend well beyond the most obvious areas of harm. These risks often result in cascading impacts across infrastructure systems[5], affecting a wide range of entities and citizens relying on various forms of infrastructure[6]. Insights from behavioural sciences further expand the scope of risk, incorporating individually perceived and socially mediated realities[7], which are often influenced by biased perceptions[8,9]. Understanding and anticipating human biases in risk management is crucial, as these biases can directly influence the causality of risks[10] and, consequently, the governance and design of infrastructure systems. Therefore, the WCIS 2050 must explore and develop more effective measures for managing systemic risks, accounting for both human behaviour and the complexity of interdependent systems.

These features underscore the growing call from researchers and multilateral agencies for transversal governance to address systemic risks, as these risks transcend spatial and sectoral boundaries, generating cascading effects[3,4]. To build a comprehensive understanding of these risks, research and case studies[8,11,12] have identified key systemic risk management themes, which include: (a) the scale of the system; (b) understanding the system; (c) the relationships between system components; and (d) the transboundary effects that extend beyond the immediate system of concern. These themes are essential for developing effective strategies to manage and mitigate the far-reaching and interconnected impacts of systemic risks.

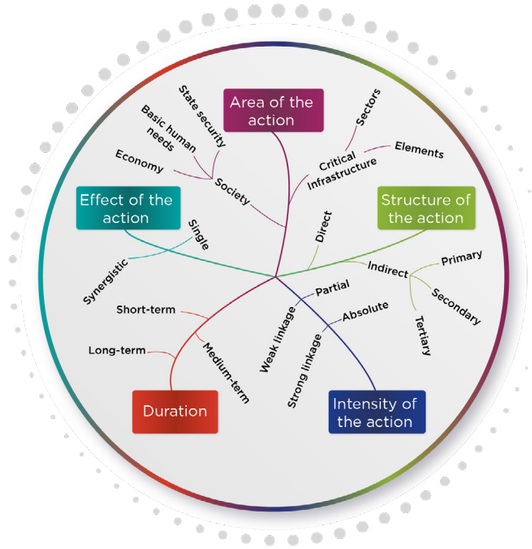


Figure 1: Infrastructure risk profiles without boundaries

Analysis of engineering and built environment (EBE) risks highlights that critical infrastructure systems (CIS) also require a similar meta-governance approach, such as Panarchic structures, to effectively manage the complex relationships and challenges they face, particularly under the added stressor of being vital to human survival[13,15]. Critical infrastructure systems are those fundamental assets that support society's most basic needs, such as water, food, and energy. While some definitions may extend to include other infrastructures like transport networks, health systems, telecommunications, and the state/military, these are considered secondary layers. The WCIS 2050 recognises the importance of prioritising and ranking these infrastructures to ensure the overall stability and wellbeing of the Western Cape.

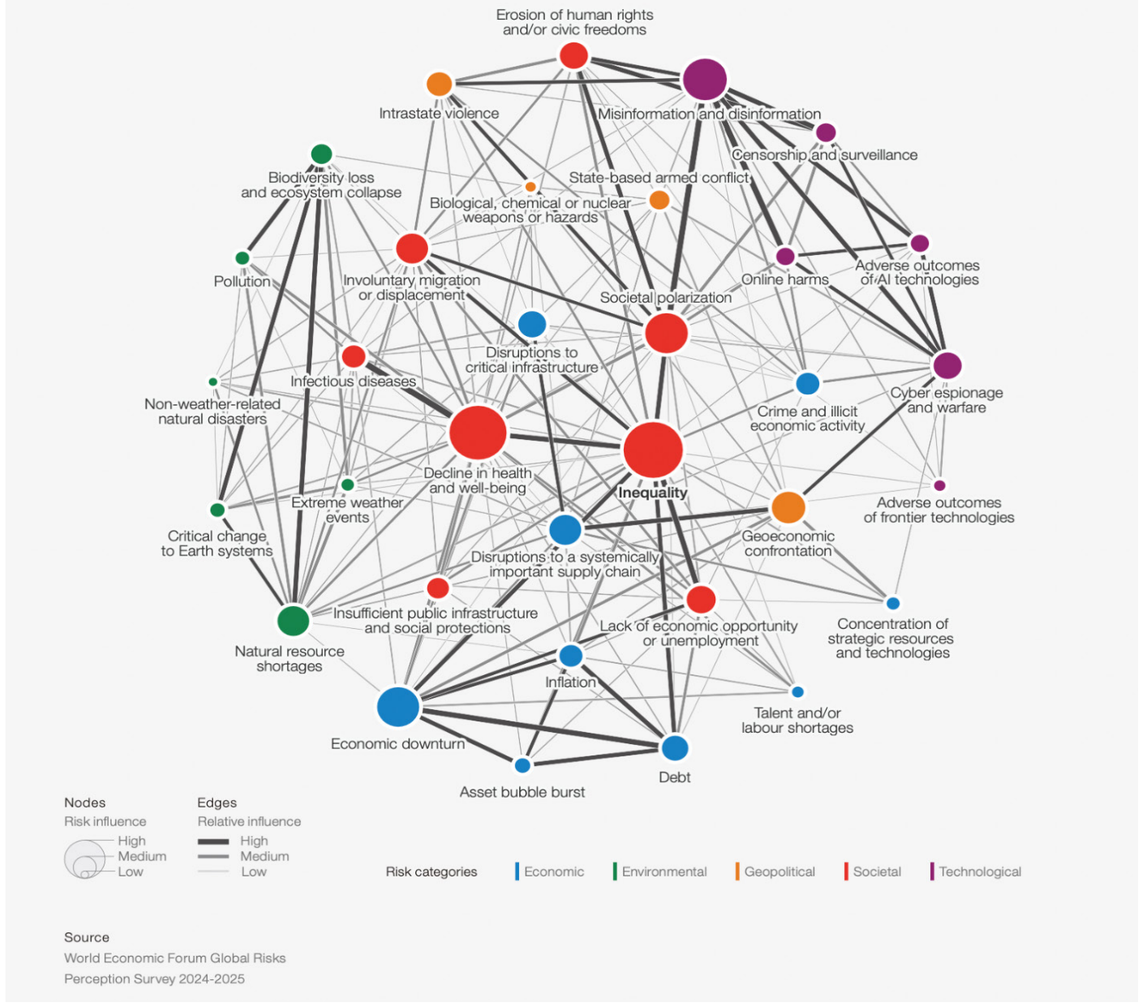


Figure 2: Global systemic risk profile (WEF, 2025)

10.2 The WCG and the Engineering and Built Environment

Transport systems, energy systems, water systems, and technological systems are explicitly identified as priority sectors in the WCIF 2050. This necessitates that the WCIS 2050 adopt a systemic risk management approach focused on understanding patterns of variability in performance, rather than relying solely on traditional fault-tree analyses common in conventional risk management[16,32]. Given the WCIF 2050's design to accommodate the multi-faceted contexts of social, political, economic, and natural systems, it inherently involves numerous actors, partners, and stakeholders, often with differing or conflicting objectives and perspectives. On this foundation, the WCIS 2050 embraces transversal governance, facilitated through the Panoptic Principles, to encompass all infrastructure types, thereby fostering the resilience needed to support sustainable infrastructure value[14,17].

Since systemic risks transcend traditional boundaries in terms of scope, time, and space, the WCIS 2050 must explore methods to navigate this expansive risk environment, extending beyond conventional engineering limitations. For example, limitations in public transport can exacerbate road traffic congestion; inefficiencies at ports can result in the degradation of road infrastructure due to increased freight traffic; and health risks can have far-reaching impacts, extending across economic and socio-political domains[18].

This context outlines how the WCIS 2050 and WCIIP 2050 aim to assist the WCG in mitigating risks that extend beyond traditional risk management practices currently applied to infrastructure in the Western Cape. From a transversal governance standpoint, the WCIF 2050 offers insights based on systemic profiling, including the following considerations:

- The WCG's complex of infrastructure defies conventional human intuition, which is often trained to seek linear connections where causality is assumed to be closely tied to time and space[19]. The interconnected nature of infrastructure risks has the potential to trigger catastrophic impacts across WCG infrastructure systems.
- Traditional management practices often anticipate predictability and rely on predefined responses (such as norms and standards). However, these standards should be complemented by novel practices (innovative approaches) that incorporate reflexive actions[20], which are responses that adapt in real time to unforeseen challenges.

When confronted with nonlinear infrastructure failures, our education and training programmes often guide us to repeat actions that were effective in the past, which can inadvertently amplify negative effects. Given that the WCIS 2050 operates within the framework of transversal governance (Panarchy), it must encourage WCG infrastructure stakeholders to move beyond fragmented and ineffective responses. This requires fostering integrated collaboration, where the contributions of diverse actors are pooled together, incentivising collective, adaptive behavioural responses that can more effectively address the complexities of systemic risks.

South Africa's cooperative governance is framed by the Intergovernmental Relations Framework Act (IGR), 2005 (Act 13 of 2005), which governs the interaction between the three spheres of government to ensure effective collaboration, as mandated by Chapter 3 of the South African Constitution[21-25]. This Act recognises the interconnectedness of government functions, necessitating cooperation in good faith. In line with this, the WCIF 2050's risk mitigation strategies depend on efforts to integrate critical infrastructure sectors, thereby improving service delivery.

South African public sector risk research highlights the need for enhanced state capacities in planning and governance, recommending a government-wide risk management model (GWRM) focused on coordination and integration of risks for sustainable cooperative governance[21-25]. Similar to global research, local studies advocate for extending risk management beyond the Public Sector Risk Management Framework (PSRMF), developed by National Treasury. Under the PSRMF, National Treasury devolves certain risk management responsibilities to Provincial Treasuries, as outlined in sections 18(2) of the Public Finance Management Act (PFMA) and sections 5(4) and 34 of the Municipal Finance Management Act (MFMA). These responsibilities typically include[21-25]:

- Establishing uniform PFMA and MFMA norms and standards.
- Monitoring and assessing PFMA and MFMA implementation.
- Assisting institutions in building financial management capacities.
- Enforcing compliance with the PFMA and MFMA.

Furthermore, National Treasury's revised Internal Audit Framework emphasises the critical role of risk management in effective corporate governance. While it remains a management responsibility, the audit committee is tasked with overseeing and advising on key risk management issues, including the efficacy of strategic risk management plans, assessing the impact of risk management on organisational controls, and ensuring the adequacy and effectiveness of fraud prevention measures.

These insights highlight that the Public Sector Risk Management Framework (PSRMF) was designed primarily to support the implementation of National Treasury's (NT) regulations, with a strong emphasis on financial management controls and internal auditing, but with limited focus on transversal infrastructure risk management[21-25]. This limitation challenges the current risk management processes, necessitating a shift towards more integrated practices that align with the principles of transversal governance.

At the same time, critical infrastructure risks largely fall under the purview of the Critical Infrastructure Council at the national level, as established by the Critical Infrastructure Protection Act of 2019. However, the Act appears to focus primarily on South Africa's National Key Points, which may not fully address the broader and interconnected risks facing critical infrastructure. Strengthening these integrative efforts and structures through intensive value creation and enhanced integration could better address the complexity of these risks, ensuring a more holistic and proactive approach to critical infrastructure protection and resilience.

The South African government holds a constitutional mandate for Disaster Management as outlined in Schedule 4, Part A of the Constitution, supported by the Disaster Management Act 57 of 2002 (DMA). The Department of Cooperative Governance oversees disaster management efforts across the country. The DMA is structured around several key areas of focus[26], including:

- **Prevention:** Taking proactive measures to reduce disaster risks.
- **Mitigation:** Minimising the impact of potential disasters.
- **Emergency Preparedness:** Ensuring readiness to respond effectively.
- **Rapid and Effective Response:** Coordinating swift action during disaster events.
- **Post-Disaster Recovery:** Facilitating restoration and rebuilding efforts.

The Act establishes Disaster Management Centres (DMCs) across all levels of government, including the National Disaster Management Centre (NDMC), which is tasked with coordinating disaster management at a national level. The NDMC operates under the guidance of the National Disaster Management Framework (NDMF), which sets out the national policy for disaster risk reduction and response.

At the provincial and municipal levels, the DMA mandates the establishment of DMCs within each province and district municipality. These centers are responsible for:

- Coordinating and managing disasters classified as local or provincial in scope.
- Declaring provincial or local states of disaster.
- Issuing regulations or directives to ensure public protection, relief, and property preservation.
- Preventing disruptions to societal and economic functions.
- Responding to and managing disaster scenarios effectively.

This framework underscores the integrated approach South Africa has adopted to manage disasters, emphasising coordination across spheres of government and aligning with principles of cooperative governance. However, the system's effectiveness depends on robust implementation, alignment with broader risk management strategies, and capacity-building at all levels.

The WCIS 2050's strategic risk themes outlined above align closely with the existing risk planning framework of the South African public sector. Establishing how these processes interconnect will significantly enhance infrastructure risk mitigation efforts. As previously noted, detailed planning and refinement will be addressed in future WCIS 2050 and WCIIP 2050 revisions through ongoing engagement with key stakeholders.

Given the novelty of this integrative approach, innovative practices will be essential to refine collective actions in pursuit of the integration targets outlined in the WCIF 2050. Encouragingly, there has been marked progress in fostering intergovernmental cooperation, interdisciplinary collaboration and cross-sectoral alignment. These advancements are supported at ministerial levels within the WCG, demonstrating a high level of commitment to this integrated approach.

This commitment has been operationalised through governance and oversight mechanisms such as the Infrastructure Ministerial Committee (IMC), Infrastructure Technical Committee (ITC) and the Regional Planning Governance (RPG) Committee.

These bodies play a pivotal role in activating and supporting cooperative governance structures, ensuring alignment and synergy across all levels of planning and implementation.

10.3 WCIS 2050's Risk Strategies

The WCIF 2050 acknowledges that systemic risks extend beyond spatial, sectoral, and national boundaries, necessitating a focus in the WCIS 2050 on risk governance strategies that address the systemic risks associated with Critical Infrastructure Systems (CIS). Central to this approach is the shift from traditional robust CIS design to more adaptive and resilient CIS design[28], driven by the increasing uncertainties surrounding these systems.

Given the inherently long-term nature of most infrastructure projects, these complexities are often magnified over time. This underscores the importance of developing risk strategies that comprehensively account for the diverse and evolving risks spanning the entire lifecycle of infrastructure, from conception and construction to decommissioning and repurposing. By adopting a holistic and forward-looking approach, the WCIS 2050 aims to enhance the resilience and adaptability of infrastructure systems to meet the challenges of an uncertain future.

Developing risk treatment strategies for the WCIF 2050 necessitates comprehensive consultation with a wide range of infrastructure stakeholders, including funders, insurers, banks, financiers, government departments, municipalities, state-owned enterprises (SOEs), and local communities. Each stakeholder group brings distinct needs and priorities, further compounded by the effects of global warming, such as excessive heat, wildfires, and flooding, which are already impacting infrastructure assets across the Western Cape.

These consultative efforts are integral and must be coordinated through the governance mechanisms of the WCG. This approach ensures that stakeholder input informs the ongoing refinement and revision of detailed risk treatment strategies outlined in the WCIS 2050. Emphasising this process is critical to ensuring that infrastructure projects align with the strategic objectives of sustainability, equity, and resilience.

By fostering collaboration and integrating diverse perspectives, the WCIS 2050 seeks to safeguard resources, enhance project outcomes, and support long-term socio-economic growth in the province. This proactive approach aims to build infrastructure systems that are not only effective in meeting present demands but also adaptive to future challenges.

Building on this foundation, the WCIS 2050 recommends strengthening existing infrastructure risk management focus areas under current protocols while proactively reducing WCIF 2050 risks through preventative measures. The WCIF 2050 underscores the importance of broadening the traditional scope of risk management to encompass an infrastructure risk architecture that addresses risks both within individual sectors and across interconnected sectors.

This expanded perspective recognises the complex interdependencies among infrastructure systems and highlights the need for integrated strategies that anticipate and mitigate cascading risks. By aligning with this vision, the WCIS 2050 aims to enhance resilience, reduce vulnerabilities, and ensure that the Western Cape's infrastructure can effectively withstand and adapt to dynamic challenges.

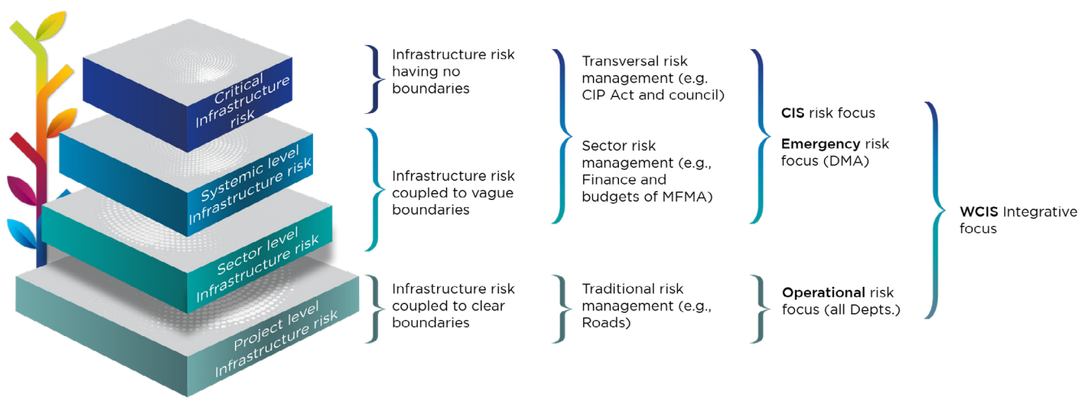


Figure 3: Convergence and amplification of infrastructure risk layers

Figure 3 provides a conceptual framework illustrating the potential structure of the WCIS 2050's integrative risk mitigation approach, with the understanding that expert stakeholder input from WCG departments will refine and adapt it. This high-level depiction is intended as a preliminary guide to position the WCG's risk governance strategy within a broader infrastructure context.

The distribution of responsibility for infrastructure risk treatment protocols across the public sector reflects the collaborative and multi-stakeholder nature of this governance approach. While illustrative, Figure 3 lays the foundation for a coordinated, comprehensive risk management framework that can evolve with future inputs and strategic developments.

Figure 3 underscores the WCIF 2050's recognition that risk management and mitigation occur across South Africa's three spheres of government[1-6]. While existing risk activities often address specific areas, such as CIS, PFMA compliance, or operational risks, the WCIF 2050 emphasises the need for an integrative approach to infrastructure risk. This perspective complements current risk management practices by embedding various policy objectives into a cohesive risk framework.

This integrative approach adds significant value by fostering collaborative and transdisciplinary risk profiles, addressing the gaps left by financial and internal control models that dominate the public sector[21-25]. It aims to provide more effective management of infrastructure lifecycle risks, ensuring that the leadership of the WCG is proactive in addressing delays in infrastructure maintenance, an area with far-reaching consequences across infrastructure portfolios.

Given the limited understanding and documentation of systemic risks affecting Western Cape infrastructure, the WCIF 2050 calls for detailed, future-focused reviews. These reviews are essential for identifying and addressing the complex risks that influence the region's infrastructure resilience and sustainability.

The WCIF 2050 highlights several critical gaps in current risk strategies[31], particularly in the integrative focus required across the infrastructure value chain. These gaps are outlined as strategic risk challenges that necessitate targeted interventions to enhance governance, planning, funding, partnerships, and technology within the infrastructure landscape:

- **Governance Risk**: This involves the challenges of integrating activities and fostering collaboration across spheres of government. It emphasises the need for planning models that accommodate the diverse mandates and objectives of stakeholders, such as the collaboration between Municipal and Provincial levels of government.
- **Design and Planning Risk**: Ignoring empathetic and context-aware design dimensions, including spatial considerations and localisation, poses significant risks. Infrastructure planning must account for these dimensions to ensure relevance and inclusivity.
- **Funding Risks**: There is a need to blend external funding mechanisms with public sector budgeting processes and equitable share allocations. Addressing this challenge is crucial for ensuring the longevity and sustainability of infrastructure value chains.
- **Partnership Risk**: Public-Private Partnerships (PPPs) must evolve to share risks and rewards transparently. Innovations in partnership models are essential to foster equitable and transparent collaborations between stakeholders.
- **Cascading Risks**: Managing systemic risks associated with critical infrastructure systems, such as water, energy, and food security, requires building capacities for cross-sectoral cooperation. This approach will help mitigate risks that span multiple sectors and systems.
- **Technology Risks**: With the growing ubiquity of IoT devices in infrastructure, there is a pressing need to address risks associated with embedded technologies. This includes the deployment of decentralised AI-bots and algorithms for infrastructure services, which is a short-term necessity to enhance resilience and efficiency.

By addressing these strategic challenges, the WCIS 2050 aims to bridge the existing gaps and position the WCG to proactively manage and mitigate risks across the infrastructure value chain.

The WCIF 2050 underscores the need to address specific features that have direct implications on infrastructure but are notably absent from current operational risk management models. To bridge this gap, the subsequent iterations of the WCIS 2050's will focus on providing detailed coordination activities and actionable strategies. These strategies will incorporate the following minimum features:

- **Critical Infrastructure Risk Identification Tools**: Developing and implementing tools to systematically identify risks that impact critical

infrastructure, ensuring early detection and proactive mitigation.

- **Critical Infrastructure Risk Management Plan**: Establishing comprehensive plans that outline protocols, responsibilities, and processes for managing risks to critical infrastructure systems.
- **Critical Infrastructure and Novel Practices**: Integrating innovative practices and methodologies to enhance resilience, adapt to emerging risks, and address infrastructure vulnerabilities effectively.

Figure 4 conceptually visualises how various risk typologies intersect and contribute to a holistic understanding of infrastructure risks. This illustration highlights the niche focal points of each risk type in context, facilitating an integrative approach to managing and mitigating risks. Figure 4 demonstrates how combining the risk spectrum enhances coordination and resilience by addressing interconnected and cascading risks across sectors and systems.

By structuring these elements within the WCIS 2050, the WCIS 2050 aims to establish a robust framework for identifying, managing, and mitigating critical infrastructure risks. This approach aligns with the broader strategic objectives of fostering sustainability, resilience, and equity across the infrastructure landscape in the Western Cape.

It is crucial to highlight that the WCIS 2050 already incorporates risk filters across both the sector prioritisation matrix (WCIS 2050, Chapter 7) and the project evaluation criteria matrix (WCIIP 2050, Chapter 5), which are derived from the WCIF 2050 Panoptic Principles. These matrices serve as a foundational tool for evaluating and mitigating risks, ensuring that the overarching infrastructure strategies are aligned with the broad, integrative goals set forth by the framework.

The approach outlined in this chapter focuses on identifying and mitigating specific infrastructure risks and also places a significant emphasis on de-risking the WCIIP 2050 itself. This is essential for ensuring that the strategic vision of the WCIF 2050 is achievable and resilient against potential disruptions.

This de-risking focus is already embedded in several areas in the WCIS 2050, which supports the goal of making the WCIIP 2050's implementation more robust:

- **Governance Setup via WCG Mechanism:** The existing governance structure established through the WCG's mechanisms provides oversight and accountability. It ensures that infrastructure projects are managed in a coordinated and transparent manner, reducing governance-related risks.
- **Tools and Models Supporting the Panoptic Principles and Matrices:** The tools, models, and risk mitigation actions within the WCIS 2050 are directly aligned with the Panoptic Principles and matrices, which emphasise a holistic, systems-based approach to infrastructure risk management. These models help guide decision-making, ensuring that risks are managed across interconnected systems, and ensuring that infrastructure is resilient to both anticipated and unforeseen challenges.

By reinforcing these strategies and highlighting their role in the de-risking process, the WCIS 2050 provides a clearer and more cohesive approach to successfully implementing the WCIIP 2050 in order to achieve the WCIF 2050's vision. This not only strengthens risk mitigation efforts but also ensures that infrastructure planning and implementation in the Western Cape are well-positioned for long-term sustainability, equity, and resilience.

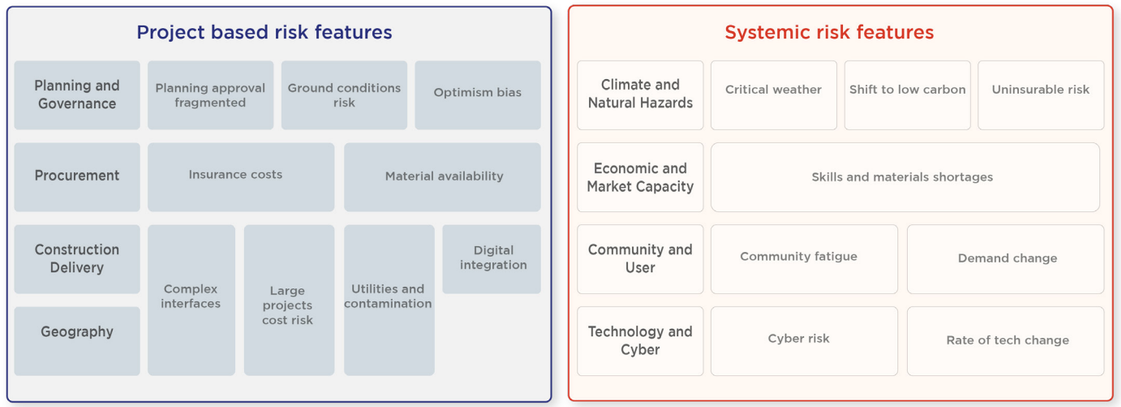


Figure 4: Infrastructure risk spectrum

10.4 Conclusion (implications for governance)

Assigning responsibility, power, and accountability to stakeholder representatives is crucial for mitigating counterintuitive threat scenarios, such as those seen in the context of climate change and biodiversity loss[29]. These scenarios often arise when governance structures fail to adequately address the complexity and interconnectedness of environmental and infrastructure risks. By ensuring that diverse stakeholder groups are actively involved in decision-making processes, risks associated with these challenges can be more effectively managed, and negative impacts can be minimised.

These perspectives on governance suggest that **inclusive governance** must evolve beyond traditional guidelines for "good governance"[11]. While the principles of transparency, accountability, and responsiveness are still essential, inclusive governance in the context of systemic risks like climate change and biodiversity loss must incorporate additional features, such as:

- **Expanded stakeholder engagement**: Ensuring that a wide range of voices, including marginalised communities, private sector entities, and environmental groups, are included in decision-making processes. This approach facilitates more comprehensive and holistic solutions that reflect the complex realities of environmental risks.
- **Integrated risk management**: Moving beyond the siloed approaches traditionally used in risk management, governance must account for the interconnectedness of risks. This requires integrating environmental, social, economic, and infrastructural risks into a cohesive framework that enables stakeholders to jointly identify, assess, and mitigate risks.
- **De-risking private sector financial profligacy**: As the private sector plays an increasingly central role in infrastructure development, there is a need to **de-risk financial practices** that prioritise short-term profits over long-term sustainability. This means creating accountability mechanisms that ensure private sector investments align with broader societal goals, such as sustainability and resilience to climate change. This approach helps to prevent situations where profit-driven decisions exacerbate environmental degradation and biodiversity loss.

By emphasising these additional features, governance structures can better address the complexity of modern risk landscapes, fostering more effective management of systemic risks. This approach not only enhances resilience but also supports the sustainable and equitable development of infrastructure and environmental systems.

Chapter 11
Conclusion

The Western Cape Infrastructure Strategy 2050 (WCIS 2050) represents a comprehensive and forward-looking plan to address the multifaceted challenges and opportunities of infrastructure growth and development in the Western Cape. Rooted in the Western Cape Infrastructure Framework 2050 (WCIF 2050), the strategy transitions vision into action, ensuring that infrastructure serves as a catalyst for economic growth, social equity, and environmental sustainability. This alignment between policy and practice underscores the WCG's commitment to fostering inclusive and sustainable development.

A hallmark of the WCIS 2050 is its commitment to integrated planning and governance. Through the robust structures of the Infrastructure Ministerial Committee (IMC) and the Infrastructure Technical Committee (ITC), the WCIS 2050 will ensure alignment across various infrastructure sectors and levels of government. These mechanisms will promote transparency, accountability, and collaboration, and create a governance environment that supports seamless implementation and adaptive management of infrastructure projects.

The operationalisation of the WCIS 2050 is detailed in the Western Cape Infrastructure Implementation Plan 2050 (WCIIP 2050), which translates strategic sector priorities into actionable and phased projects. The WCIIP 2050 adopts a practical approach by prioritising key infrastructure projects through a panoptic scoring model.

Stakeholder engagement and partnerships form the backbone of the WCIS 2050 and its operationalisation in the WCIIP 2050. By incorporating inputs from municipalities, private sector entities, and communities, the WCIIP 2050 will ensure that infrastructure planning is responsive to local needs while fostering collaboration across diverse interest groups. This inclusivity strengthens social cohesion and ensures that the benefits of infrastructure investments are equitably distributed.

The WCIIP 2050 operationalises the WCIS 2050's focus on sustainability and resilience by embedding ecological and climate-adaptive principles into infrastructure projects. Through its sector prioritisation, the WCIIP 2050 will translate the WCIS 2050's strategic focus into targeted actions that deliver maximum impact. Investments in renewable energy, and resource-efficient systems are prioritised to ensure that the WCG remains a leader in sustainable development. The WCIIP 2050 will incorporate adaptive project designs that respond to climate risks, enhancing the resilience of critical infrastructure systems.

Innovative financing models outlined in the WCIS 2050 are implemented through the WCIIP 2050 to address funding constraints and unlock investment potential. Public-private partnerships and alternative funding mechanisms will be implemented to diversify financial resources and ensure that infrastructure projects deliver measurable social and economic returns. These mechanisms allow for scalability and sustainability in project financing.

The WCIS 2050 is a testament to the WCG's vision and strategic foresight. By aligning with national and provincial priorities, leveraging partnerships, and adopting innovative approaches, the WCIS 2050 lays a strong foundation for transformative infrastructure growth and development.

Glossary, acronyms and abbreviations

A

Adaptation
Any adjustment in natural or human systems in response to actual or expected environmental (including climatic) stimuli that moderates harm or exploits beneficial opportunities.

Adaptive System
A system capable of adjusting and evolving in response to changes in its environment, recognising the interconnected and dynamic nature of infrastructure.

Artificial Intelligence (AI)
Refers to the simulation of human intelligence processes by machines, especially computer systems. It involves creating algorithms and models that enable machines to perform tasks that typically require human-like cognitive functions such as reasoning, learning, problem-solving, perception and language understanding.

Asian Infrastructure Investment Bank (AIIB)
A multilateral development bank established in 2016 to address the growing infrastructure needs in Asia. Its primary goal is to promote economic development, enhance connectivity and support sustainable infrastructure projects across the Asian region, thereby contributing to the overall economic growth and poverty reduction in member countries.

Annual Performance Plan (APP)
A key management and planning document used by government departments, organisations or institutions to outline their strategic objectives, goals and targets for a specific fiscal year. It serves as a roadmap that guides the activities and performance of the organisation throughout the year, ensuring alignment with the overall strategic vision and priorities.

Annual Report (AR)
A comprehensive document produced by an organisation, typically at the end of its financial year, that provides detailed information about its activities, financial performance, achievements and challenges over the past year. It serves as a tool for communicating with stakeholders, including shareholders, investors, employees, customers and the public, to provide transparency and accountability.

Annual Operational Plan (AOP)
A detailed, short-term tactical document that outlines the specific actions, initiatives and resources required to achieve the strategic objectives of an organisation during a particular fiscal year. It translates the broader goals and priorities set in the organisation's long-term or strategic plan into actionable steps, focusing on operational efficiency and effectiveness.

B

Bankable Infrastructure
Infrastructure projects that are financially viable and attractive to investors due to their compliance with recognised standards and minimal ESG risks.

Best Practice
Established methods and techniques that have been proven to achieve desired results efficiently and effectively, typically applied in stable and predictable contexts.

Biophilia
The desire to connect, or seek connections with nature and other living things.

Biophilic Design
The concept of integrating natural elements into infrastructure design to enhance the wellbeing and health of communities.

Blended Finance
A financial approach that combines public and private funds to support infrastructure projects, often including concessional funding to attract private investment.

Brazil, Russia, India, China, South Africa (BRICS)
An intergovernmental organisation that consists of Brazil, Russia, India, China and South Africa.

Broadband Infrastructure
High-speed internet infrastructure that provides fast, affordable and reliable internet connectivity, crucial for digital inclusion and the functioning of modern societies.

Build Capacity Using Research Evidence (BCURE)
A programme aimed at enhancing the use of research evidence in decision-making within governments and other public sector organisations. The initiative focuses on improving the capacity of policymakers and public servants to understand, access and apply research evidence in their work, particularly in the areas of governance, public policy and service delivery.

C

Capital Expenditure
Spending on long-term assets, such as infrastructure projects, which provides future benefits and is recorded separately from operational expenditure.

Chaotic Contexts
Situations with numerous interlocked and dynamic interactions leading to unpredictable outcomes, necessitating emergent and novel practices.

Climate Change Adaptation Framework (CCA)
A strategic approach developed by the Western Cape Government to address the impacts of climate change on the region. The framework focuses on how the province can adapt to the changing climate by implementing policies, strategies and actions that reduce vulnerabilities, build resilience and ensure sustainable development in the face of climate-related challenges.

Circular Economy
An economic system aimed at eliminating waste and the continual use of resources through reusing, remanufacturing and recycling based on closed-loop systems.

Citizen-Centric
Ensuring that citizens and their communities are at the centre of design and solution processes for infrastructure projects.

Critical Infrastructure Systems (CIS)
Refers to the essential physical and virtual assets, systems and networks that are fundamental to the functioning of a country, economy or society. These systems are vital for maintaining national security, public safety, economic stability and the wellbeing of citizens.

Collaborative Infrastructure Planning
A strategic approach that involves multiple stakeholders in the planning and decision-making process for infrastructure projects.

Communities of Practice (COPs)
Groups of people who share a concern or a passion for something they do and learn how to do it better through regular interaction.

Complex Adaptive Systems (CAS)
Infrastructure systems characterised by numerous interacting components that adapt and evolve over time, similar to natural ecosystems.

Contingency Reserve Fund (CRF)
The BRICS-led Contingency Reserve Fund.

Criteria-Based Methods
Approaches that use predefined criteria to evaluate and prioritise projects based on their ability to meet objectives.

Commercial Value Capture (CVC)
Often associated with mass transit, its application extends to a wide range of infrastructure sectors, including tourism, energy, waste management, telecommunications, biochar and composting.

D

Data Governance
The management of data availability, usability, integrity and security within an organisation. It involves setting policies, procedures and standards to ensure data quality and compliance with regulations.

Department of Economic Development and Tourism (DEDAT)
The Western Cape Government department whose primary role is to drive and support economic growth, job creation and tourism in the province. The Department focuses on fostering a business-friendly environment, promoting investment, supporting local industries and enhancing the region's tourism sector.

District Economic Alignment Project (DEAP)
A strategic initiative aimed at aligning economic development efforts across the various districts in

the Western Cape to ensure a more coordinated, inclusive and regionally focused approach to economic growth and job creation.

Department of Agriculture (DOA)
The Western Cape Government department responsible for supporting and promoting agricultural development in the Western Cape province of South Africa. This includes enhancing the agricultural sector's sustainability, productivity and competitiveness, while also ensuring the provision of services to farmers and rural communities.

Department of Infrastructure (DoI)
The Western Cape Government department responsible for planning, delivering, and maintaining infrastructure, as well as managing provincial roads, public works, and human settlements. Formerly known as the Department of Transport and Public Works (DTPW) and the Department of Human Settlements (DHS).

Department of Local Government (DLG)
The Western Cape Government department responsible for supporting and overseeing the local government sector. Its core mandate is to promote effective governance, service delivery and development at the municipal level, ensuring that local governments have the capacity and resources to provide essential services to their communities.

Development Bank of Southern Africa (DBSA)
A development finance institution focused on large-scale infrastructure projects in South Africa and the broader Southern African region.

Department of Environmental Affairs and Development Planning (DEA&DP)
The Western Cape Government department responsible for safeguarding the natural environment of the Western Cape for future generations while sustainably developing the province's landscape. Its core mandate is to enable a resilient, sustainable, quality and inclusive living environment for all by improving urban and rural areas through enhanced management of land, an enhanced climate change plan, and better living conditions for all.

Digital Economy
An economy that is based on digital computing technologies. It encompasses all economic activities that use digital information and knowledge as key factors of production.

District Development Model (DDM)
The District Development Model aims to improve the coherence and impact of government service delivery with focus on 44 Districts and 8 Metros across South Africa as development spaces that can be used as centres of service delivery and economic development, including job creation.

Digital Inclusion
Efforts to ensure all individuals and communities, including the most disadvantaged, have access to and can effectively use information and communication technologies (ICTs).

Disaster Management Centres (DMCs)
Specialised facilities or units within a government or organisational structure that are responsible for coordinating disaster management efforts before, during, and after a disaster. Their primary purpose is to ensure a swift and organised response to emergencies, mitigate disaster risks and enhance overall community resilience to disasters.

Department of Planning, Monitoring and Evaluation (DPME)
A national government department responsible for overseeing the planning, monitoring and evaluation of government policies, programmes and projects. Its primary role is to ensure that the country's national development plans and government strategies are effectively implemented and that progress is monitored to achieve the desired outcomes.

Department of Transport and Public Works (DTPW)
The Department of Public Works and Infrastructure (DPWI) is a national government department responsible for managing and overseeing public infrastructure, government buildings, and public works projects.

Digital Transformation
The process of integrating digital technologies into all areas of a business or organisation, fundamentally changing how they operate and deliver value to customers.

Development Finance Institutions (DFIs)
Specialised financial institutions established by governments or international organisations to provide financing for projects and initiatives that promote economic development, particularly in sectors or regions that may not attract sufficient private investment.

E

Engineering and Built Environment (EBE)
An academic and professional field that encompasses a wide range of disciplines concerned with the design, construction and maintenance of infrastructure, buildings and other physical environments.

European Central Bank (ECB)
The central bank for the eurozone.

Ecosystem
The physical environment and the community of living organisms living in a particular area.

Ecological Infrastructure
Naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction. Examples include healthy mountain catchments, rivers, wetlands, coastal dunes, and nodes and corridors of natural habitat.

Ease of Doing Business (EODB)
The set of policies, regulations and practices that a government implements to make it easier, faster and less costly for businesses to start, operate and grow within a country or region.

Environmental, Social and Governance (ESG)
A set of aspects, including environmental issues, social issues, and corporate governance that can be considered in investing.

Expanded Public Works Programme (EPWP)
A South African government initiative aimed at job creation through public infrastructure projects.

F

Feedback Mechanism
Processes through which stakeholder engagement provides continuous input, allowing the infrastructure system to learn, adapt and improve.

Foreign Direct Investment (FDI)
Investment from foreign sources, particularly in sectors such as energy, transport, and telecommunications, can provide not only capital but also technology and management expertise.

Framework for Infrastructure Delivery and Procurement Management (FIDPM)
A 2019 framework focused on governance to support infrastructure delivery, replacing the Standard for Infrastructure Procurement and Delivery Management, guiding infrastructure procurement by various government tiers.

Food Poverty Line (FPL)
The minimum amount of money required to afford basic food items that provide the necessary daily caloric intake to maintain health. It is a benchmark used by policymakers and researchers to measure extreme poverty, where individuals or households are unable to meet even their most basic food needs.

G

Gigamap
A comprehensive visual representation of the process and information that informed the development and summarises the WCIF 2050 in an infographic.

Governance
The framework of rules, relationships, systems, and processes within and by which authority is exercised and controlled in infrastructure projects.

Government-Wide Monitoring and Evaluation System (GWMES)
A national government framework to monitor, assess and improve the performance of public sector programmes and projects. Its primary aim is to track the effectiveness and efficiency of government interventions, ensuring that public policies and service delivery meet their intended goals and contribute to national development objectives.

Government Immovable Asset Management Act (GIAMA)
South African legislation (Act No. 19 of 2007) outlining the responsibilities of custodians and users of immovable assets, emphasising efficient asset management and alignment with service delivery and social development objectives.

Government-as-a-Platform (GaaP)
A vision for government structures where digital platforms are used to streamline and enhance the delivery of public services, making them more efficient, transparent and citizen-centric.

Green Building
A building that, in its design, construction, or operation, reduces or eliminates negative impacts on the climate and natural environment, preserving natural resources and improving quality of life.

Green Climate Fund (GCF)
A global financial mechanism was established to assist developing countries in their efforts to combat climate change. It was created under the United Nations Framework Convention on Climate Change (UNFCCC).

Gross Domestic Product (GDP)
A measure of the total value of all goods and services produced within a country's borders during a specific time period.

Global Environment Facility (GEF)
An international partnership and financial organisation established in 1991 to address global environmental challenges that funds projects and programmes in developing countries to tackle critical environmental issues, such as biodiversity loss, climate change, land degradation, pollution of international waters, and the depletion of the ozone layer.

Global Evaluation Initiative (GEI)
Uses communication tools to facilitate community participation and engagement, aiming to foster transformative monitoring and evaluation.

Growth for Jobs (G4J) Strategy
A strategy focusing on infrastructure and connected economy to support job creation and economic growth in the Western Cape.

Global Public Goods (GPGs)
Global public goods are goods, services, or resources that are widely available and beneficial across countries, regions, or even globally, and whose benefits are non-excludable and non-rivalrous.

Global Value Chains (GVCs)
Also known as Extended Value Chains (EVCs), these serve as platforms for diverse agents to interact, articulate their respective demands, experiment, co-learn, foster collective action, coordinate, build capacities, and enhance business linkages.

H

Human Settlements
Infrastructure projects aimed at developing residential areas with adequate access to services such as transportation, economic and social facilities.

I

Inequality
The unequal distribution of wealth, income, opportunities and resources within a society. In South Africa, this often reflects the enduring effects of apartheid-era policies.

InfraGov
The Infrastructure Governance Assessment Framework introduced by the World Bank to assist countries in optimising infrastructure investments and achieving better outcomes.

Infrastructure
The fundamental facilities and systems serving a country, city, or area, including transportation, communication, power plants and schools. It is crucial for economic growth, development and quality of life.

Infrastructure Delivery Management System (IDMS)
A framework for managing the planning, procurement and delivery of infrastructure projects to ensure efficiency and compliance.

Integrated Development Plans (IDPs)
A cornerstone of municipal governance in South Africa, serving as a five-year strategic plan that guides development and service delivery at the local level.

Infrastructure System
The complex network of interacting stakeholders, processes and systems involved in infrastructure development and management.

Infrastructure Life-Cycle Asset Management
Managing infrastructure assets throughout their entire life cycle, from planning and construction to maintenance and decommissioning.

Infrastructure Standards
Set guidelines and norms that dictate the design, construction and operation of infrastructure projects, aimed at ensuring safety, efficiency, and sustainability.

Infrastructure Value Chain
The sequence of activities involved in the development, management and maintenance of infrastructure projects, from planning to execution.

Infrastructure-as-a-Service (IaaS)
A model where infrastructure is provided as a service, allowing organisations to outsource their infrastructure needs to a third-party provider, which manages and maintains it.

Information and Communication Technology (ICT)
A broad term that integrates both information technology (IT) and communication technologies. It encompasses the technologies and tools used to handle information and enable communication and includes the hardware, software, networks and systems that facilitate the storage, retrieval, sharing and transmission of data.

Internet of Things (IoT)
Refers to a network of interconnected physical devices, vehicles, appliances and other objects that are embedded with sensors, software and other technologies to collect, exchange and act on data over the internet. These devices can communicate with each other and with centralised systems, enabling automation, monitoring, and enhanced functionality.

Intergovernmental Panel on Climate Change (IPCC)
An international body conducting regular reviews and producing reports on the status of climate change. The Sixth Assessment Review (AR6) recognises the interdependence of climate, ecosystems and biodiversity, and human societies.

Innovative Revenues for Infrastructure (IRI)
Funding tool that leverages revenue generated from infrastructure assets.

International Organisation for Standardisation (ISO)
An international body that develops and publishes standards to ensure quality, safety, efficiency and interoperability of products and services across the globe.

Infrastructure Ministerial Committee (IMC)
Chaired by the Minister of Infrastructure and comprises a core group of executive leaders, allowing for targeted contributions, strategic alignment and efficient decision-making in the planning and implementation of infrastructure initiatives.

International Monetary Fund (IMF)
A global financial organisation established in 1944 to promote international monetary cooperation, ensure financial stability, facilitate international trade and reduce poverty worldwide. It is headquartered in Washington, D.C. and operates as a specialised agency of the United Nations, although it is an independent entity.

Infrastructure Framework Review (IFR)
Initiated in 2021, it played a vital role in refining the WCIF 2050's stakeholder engagement strategies.

Infrastructure Technical Committee (ITC)
Responsible for operational execution and coordination on an administrative level chaired by the Head of Department of Infrastructure.

J

Joint District and Metro Approach (JDMA)
A framework that allows the three spheres of government in the Western Cape to work together to develop strategic, developmental and planning priorities.

Just Transition
The shift towards a low-carbon, climate-resilient economy and society, and ecologically sustainable economies and societies which contribute toward the creation of decent work for all, social inclusion and the eradication of poverty.

Just Transition Framework (JTF)
A framework outlining policy measures and commitments from various social partners to minimise the social and economic impacts of the climate transition, aiming to improve the livelihoods of those most vulnerable to climate change.

K

King IV Report (King IV)
A report on Corporate Governance for South Africa, which was released in 2016 by the King Committee on Corporate Governance. It is a set of guidelines and principles designed to help organisations adopt ethical, effective and sustainable governance practices. The King IV Report focuses on the governance of companies, non-profit organisations and other types of entities in South Africa, but its principles are widely applicable and have been adopted internationally.

L

Land Value Capture (LVC)
An urban planning and economic concept that refers to the process of capturing the increase in land value (or "land rents") that occurs due to public investments, infrastructure developments or other government actions. This increased value is then used to fund public projects, infrastructure, or social programmes.

M

Maintenance
The preventative, reactive and predictive upkeep necessary to keep infrastructure in good working order and extend its useful life.

Meta-Level Evaluation
An initial evaluation stage used to make broad decisions about project viability and resource allocation.

Monitoring and Evaluation (M&E)
The systematic process of tracking the performance of infrastructure projects and assessing their outcomes against the set objectives and goals.

Multi-Criteria Decision Analysis (MCDA)
A method for evaluating and prioritising projects based on multiple criteria, providing a comparative basis for decision-making.

Municipal Finance Management Act (MFMA)
South African legislation (Act No. 56 of 2003) that regulates financial practices and accountability at the municipal level.

Municipal Infrastructure Grants (MIG)
Refers to financial assistance provided by central or national governments to local or municipal governments to support the development, maintenance and upgrading of infrastructure at the local level. These grants are typically targeted at improving basic services and infrastructure in municipalities, particularly in developing regions or underserved areas.

Municipal Spatial Development Framework
Strategic planning tools that guide spatial development and land-use management within a municipality.

N

Nationally Determined Contribution (NDC)
South Africa's pledge to reduce greenhouse gas emissions, contributing to global efforts to keep the increase in the average temperature well below 2°C, with aspirations to limit the increase to 1.5°C above pre-industrial levels.

National Disaster Management Centre (NDMC)
Its tasks include coordinating disaster management at a national level.

National Development Plan (NDP)
South Africa's long-term plan, aiming to eliminate poverty and reduce inequality by 2030, with infrastructure investment as a critical enabler for inclusive and sustainable economic growth.

Non-Governmental Organisation (NGO)
A non-profit organisation that operates independently from government control or influence. They are typically driven by a social, humanitarian or environmental mission and aim to address various issues such as poverty, human rights, education, health, environmental protection, and disaster relief.

Non-Profit Organisation (NPO)
An organisation that operates for purposes other than generating profit for its owners or shareholders. Its primary goal is to serve the public interest or a specific community by addressing social, cultural, environmental, or humanitarian issues and any income generated is reinvested into its activities, programmes or services.

National Infrastructure Plan 2050 (NIP 2050)
A strategic framework aimed at boosting investment and coordinating infrastructure development in South Africa.

National Spatial Development Framework (NSDF)
A framework guiding spatial development planning in South Africa to address past inequities and support economic growth and development.

National Land Transport Framework (NLTF)
Part of South Africa's legislative framework for managing and coordinating land transport at national, provincial and local levels, providing strategic guidance for planning, funding, and implementing transport systems throughout the country, including in the Western Cape.

Novel Practice
Innovative methods used in complex and contested situations where traditional best practices may not apply, particularly useful for addressing unique local needs.

O

Organisation for Economic Cooperation and Development (OECD)
An international organisation founded in 1961 to promote policies that improve the economic and social wellbeing of people around the world. It provides a platform for governments to discuss and coordinate policies, share experiences, and collaborate on solutions to global economic, social, and environmental challenges.

Original Equipment Manufacturer (OEM)
A company that manufactures components or products that are then marketed and sold by another company under its own brand name. OEM pricing typically involves the cost of products, parts or equipment that are supplied by the manufacturer to another company, which then incorporates these products into their own offerings or sells them as-is.

P

Panarchic Governance
A governance model that emphasises adaptability, interconnectedness and resilience across different levels of governance. It aims to harness the public good potential of digital technologies and ensure sustainable infrastructure development.

Panarchy
A framework for transversal governance ensuring data-driven practices while guarding against false methodological superiority.

Panoptic Principles (PPs)
The foundational principles guiding the Western Cape Infrastructure Framework (WCIF) 2050 to ensure inclusive, innovative and resilient infrastructure development.

Partnership for Evidence and Equity in Responsive Social Systems (PEERSS)
A collaborative initiative that focuses on improving social systems through evidence-based practices and fostering equity. Its goal is to create and support systems that are more responsive to the needs of diverse communities, particularly those that are historically underserved or marginalised.

Prioritisation Models
Frameworks or tools used to rank projects based on various criteria, such as benefits, costs and risks.

Project Scoping
Defining the objectives, deliverables and constraints of a project to determine its feasibility and scope.

Project Support Facilities
Structures or institutions designed to assist with the preparation, planning and management of infrastructure projects to ensure effective use of funds and resources.

Provincial Strategic Plan (PSP)
The Western Cape Government's 5-year strategic plan outlining its vision and objectives over the next five years for the period 2025 to 2030.

Project Focus Area (PFA)
Refers to a specific domain, region or aspect within a project that is prioritised for attention and resources - the part of the project where efforts are concentrated to achieve certain objectives, outcomes or deliverables.

Private Finance Initiative (PFI)
A method of financing public infrastructure projects through a partnership between the government and private sector companies.

Public Finance Management Act (PFMA)
South African legislation (Act No. 1 of 1999) ensuring fiscal accountability and compliance with financial management practices in government departments and entities.

Provincial Land Transport Framework (PLTF)
A strategic management tool for the Western Cape Mobility Department, outlining the vision, objectives, and policies related to land transport in the region. It includes current public transport strategies, sector strategies, and associated financial, monitoring, and institutional arrangements.

Public-Community Partnerships
Collaborations between government entities and local communities or civil society organisations to address local development needs.

Project Preparation Facility (PPF)
An initiative designed to assist local governments, municipalities and other stakeholders in the Western Cape region of South Africa in preparing and developing infrastructure projects. It provides financial and technical support to help these entities prepare projects that are ready for implementation, with a focus on improving the quality, efficiency and sustainability of public infrastructure.

Public Private Partnership (PPP)
A contractual arrangement between a public authority and a private sector entity for providing public infrastructure or services, where both parties share risks and responsibilities.

Public Sector Risk Management Framework (PSRMF)
Designed primarily to support the implementation of National Treasury (NT) regulations, with a strong emphasis on financial management controls and internal auditing, but with limited focus on transversal infrastructure risk management.

Provincial Spatial Development Framework (PSDF)
A strategic planning tool used by provincial governments to guide land use, spatial development and growth across a region. It provides a framework for making decisions about how land and resources should be used and developed in the future, aiming to promote sustainable, balanced, and equitable growth within the province.

R

Resilience
The capacity of social, economic (human), and environmental systems to cope with a hazardous event, trend, or disturbance, maintaining their essential function, identity, and structure, and adapting, learning, and transforming in response.

Resilient Infrastructure
Infrastructure designed to withstand and adapt to extreme weather events, climate change and other disruptions.

Resilient Infrastructure Value Chains
Infrastructure systems harmonised with ecological imperatives to build resilience and sustainability.

Regional East African Community Health Policy Initiative (REACH-PI)
A collaborative effort aimed at improving health systems and policies across the East African region. The initiative is designed to strengthen health policy development and implementation, improve access to quality healthcare services, and address regional health challenges.

Research, Monitoring and Evaluation (RM&E)
Tools used to create a holistic framework.

Return on Investment (ROI)
A measure of the profitability or financial return of a project relative to its costs.

Risk Assessment
Evaluating potential risks and their impact on a project or programme to inform decision-making.

Risk Management
The identification, assessment, and prioritisation of risks followed by coordinated efforts to minimise, monitor, and control the probability or impact of unfortunate events.

Request For Bid (RFB)
A formal solicitation process used by organisations, governments or businesses to invite vendors or contractors to submit competitive bids for a specific project, service or procurement. It outlines the requirements, specifications and criteria for the project or service and is commonly used in public procurement and contracting processes.

Request For Information (RFI)
A formal process used by organisations to gather information from potential suppliers or service providers before proceeding with a more detailed procurement process, such as issuing a Request for Proposal (RFP) or Request for Bid (RFB). It is typically used to learn more about the capabilities, solutions and qualifications of vendors and helps the organisation make informed decisions about the next steps in the procurement process.

Request for Quotation (RFQ)
A formal document used by organisations to request price quotes for specific products, services or projects from potential suppliers or vendors. It outlines the detailed requirements, quantities and specifications for the goods or services needed and suppliers respond with a cost estimate. They are typically used when the buyer has a clear understanding of the product or service requirements and is seeking competitive pricing.

Rehabilitate-Own-Operate (ROO)
A project delivery model in which a private entity takes over an existing asset or infrastructure, rehabilitates or upgrades it, and then owns and operates it indefinitely.

Regional Planning Governance (RPG)
The Regional Planning Governance (RPG) Committee will report into the ITC to serve as a senior management-level technical working group dedicated to facilitating the coordination, integration and implementation of regional infrastructure and planning initiatives across the Western Cape.

Risk Transfer
In PPPs, the allocation of project risks to the party best able to manage them, which can lead to more efficient risk management.

S

Silver Dividend
The economic contributions of an ageing population, particularly affluent retirees, who can support economic growth through their spending and investments.

Six Capitals
A framework incorporating financial, manufactured, intellectual, human, social and relationship, and natural capitals to ensure comprehensive value creation, including value for money as defined by the International Development Association (IDA).

Service Delivery Improvement Plan (SDIP)
A strategic framework developed by government agencies or organisations to enhance the quality, efficiency and accessibility of public services. The plan outlines specific actions, resources and strategies aimed at improving how services are provided to the public and ensuring that service delivery meets the needs and expectations of citizens.

Spatial Justice
The principle of equitable distribution of infrastructure and resources to address past spatial imbalances and improve access for all communities.

Small and Medium-Sized Enterprise
It refers to businesses that fall within a specific range in terms of size, revenue and number of employees, as defined by various regional or national standards. SMEs are a vital part of the global economy, contributing significantly to employment, innovation, and economic growth.

Strategic Plan (SP)
A formal document or framework that outlines an organisation's long-term goals, objectives and the strategies to achieve them. It serves as a roadmap for decision-making, guiding the organisation toward its desired future while aligning resources, priorities and efforts.

Spatial Planning and Land Use Management Act (SPLUMA)
South African legislation (Act No. 16 of 2013) setting principles and procedures for infrastructure investment in priority areas, ensuring coordinated and sustainable development.

Special Purpose Vehicle (SPV)
A legally separate entity created by a parent company or organisation for a specific, well-defined purpose. Also known as a Special Purpose Entity (SPE), it is often established to isolate financial risk, manage specific projects or hold assets.

Spatial Transformation
The process of changing the physical and social landscape of a region to achieve more equitable distribution of resources and services.

Stakeholder Engagement
The process of involving individuals or groups who have an interest in or are affected by infrastructure. The process of involving individuals or groups who have an interest in or are affected by infrastructure projects, ensuring their needs and expectations are considered throughout the project lifecycle.

Systems-Oriented Design (SOD)
A powerful tool for addressing complexity by creating shared, holistic understandings of problem situations.

State Owned Enterprises (SOEs)
Entities owned or controlled by the government, providing public goods or services.

Supply Chain Management (SCM)
Refers to the coordination and management of all activities involved in the production and delivery of goods and services, from the acquisition of raw materials to the final product delivered to consumers. It encompasses the planning, sourcing, production, logistics and distribution of products, ensuring that the right goods are delivered at the right place, at the right time and at the right cost.

Sustainable Development Goals (SDGs)
A collection of 17 global goals set by the United Nations to address global challenges and achieve a better and more sustainable future for all by 2030.

Sustainable Infrastructure
Infrastructure designed and operated in a way that ensures economic, social and environmental sustainability, aiming to meet the needs of the present without compromising future generations.

Sustainable Infrastructure Development and Finance Facility (SIDAFF)
A facility focused on providing technical support and expertise to towns in the Western Cape for accessing funding and developing infrastructure projects.

Systems View
An approach that considers the interconnectedness and interdependence of various components within an infrastructure system.

Strength, Weakness, Opportunity and Threat (SWOT) Analysis
A strategic planning tool used by organisations to evaluate their internal strengths and weaknesses, as well as external opportunities and threats. It helps businesses, governments and other entities assess their current position and formulate strategies for improvement, growth and risk management.

T

Theory of Change (TOC)
Framework used in intervention monitoring, providing a structured method for understanding how specific interventions contribute to long-term change.

Terms of Reference (ToR)
A document that outlines the scope, objectives, deliverables and responsibilities for a specific project, committee or task. It serves as a detailed guide for all parties involved, providing clarity on the expectations, roles, and procedures that need to be followed.

Transversal Governance
Integrated, cross-disciplinary planning and management of infrastructure projects to ensure comprehensive and effective governance.

Triple Bottom Line
An evaluation framework considering three dimensions: economic, social, and environmental sustainability.

Triple-Helix Model
A framework for innovation involving collaboration between the public sector, private sector and academia.

Two-Dimensional IPF Approach
An approach using two indices (social-environmental and financial-economic) to prioritise projects, plotted on a Cartesian plane.

U

United Nations (UN)
An international organisation founded in 1945 after World War II with the aim of promoting peace, security, cooperation and development among its member countries. It was created to prevent conflicts, address global challenges and promote human rights, sustainable development, and humanitarian aid.

V

Value-for-Money
A principle ensuring that the investment in infrastructure provides the best possible outcomes in terms of cost, efficiency, and effectiveness over its lifecycle.

Volatile, Uncertain, Complex, and Ambiguous (VUCA)
Describes the challenging and unpredictable nature of infrastructure planning and decision-making.

W

Western Cape Climate Change Response Strategy (WCCCRS)
A strategy updated in 2023 to address the global climate emergency, providing policy direction for a green, low-carbon economic recovery and mitigating climate-related risks in the Western Cape.

Western Cape Ecological Investment Infrastructure Framework (EIIF)
A framework guiding public and private sector decision-makers on investing to promote the resilience of the Western Cape's ecological infrastructure, addressing risks such as water security threats and rangeland degradation.

Western Cape Economic Inclusion and Investment Fund (WCEIIF)
An initiative established by the Western Cape Government to promote economic growth and inclusion in the region. The fund aims to support businesses, particularly small and medium-sized enterprises (SMEs), that contribute to inclusive economic development by addressing barriers to growth and enhancing opportunities for historically disadvantaged individuals and communities.

Western Cape Government (WCG)
The provincial government of the Western Cape, South Africa, responsible for regional governance and development.

Western Cape Government Project Preparation Facility (WCG PPF)
A facility that helps develop and prepare investment-ready infrastructure projects in the Western Cape, aiming to build a credible project pipeline.

Western Cape Infrastructure Framework 2050 (WCIF 2050)
A strategic framework outlining the principles, priorities, and objectives for infrastructure provision in the Western Cape region by the year 2050.

Western Cape Infrastructure Strategy 2050 (WCIS 2050)
Infrastructure Strategy informed by the WCIF 2050.

Western Cape Infrastructure Implementation Plan 2050 (WCIIP 2050)
Implementation plan for the WCIS 2050.

Western Cape Infrastructure Delivery Management System (WCIDMS)
A system that integrates with FIDPM, guiding infrastructure delivery and procurement processes within the Western Cape.

Western Cape Spatial Development Framework (WCSDF 2035)
A strategic planning document developed by the Western Cape Government to guide spatial planning and land-use decisions in the region. The framework provides a long-term vision for the development and management of land, infrastructure and resources in the province, aiming to promote sustainable growth, economic development, environmental protection and social equity.

Y

Youth Dividend
The economic benefit that can arise from having a large, youthful population, provided there are adequate opportunities for employment, education and development.

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